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Performance analysis of 5-S teams using quality circle financial accounting system

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Abstract

Purpose – The purpose of this paper is to explore the practical feasibility of adopting a Quality Circle Financial Accounting System (QCFAS) for analyzing the performance of 5-S teams.

Design/methodology/approach – First the literature was surveyed to study the state of the art of 5-S. This study revealed the importance of analyzing the financial performance of 5-S. Since, 5-S contains tangible and intangible activities, it was decided to adopt the QCFAS to financially account it. The practical validity of this preposition was tested by conducting an implementation study in a unit of a multinational abrasive manufacturing company operating in India

Findings – The literature review led to the finding that 5-S could be used as an interweaving device for conglomerating world class paradigms such as total quality management (TQM) and quality circles (QCs). The practical implementation study revealed the compatibility of employing QCFAS for financially accounting 5-S teams.

Research limitations/implications – The implementation study was conducted in a Indian Company. This limited study threatens the general validity of QCFAS in financially accounting 5-S. However, this threat is not expected to be severe because the company is a multinational company and the working atmospheres prevailing in it mimic those of companies situated in various parts of the world.

Originality/value – Though 5-S has been popular for some time, the research on it has been minimal. Further no research has examined the financial accountability of 5-S. Hence, the contributions of this paper are original and valuable in helping to overcome a general reluctance to implement 5-S.

Keywords Total quality management, Performance measures, Profit and loss accounts, Balance sheets, Quality circles

Paper type Research paper

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Introduction

The 5-S practice developed by Takasi Osada during the 1980s (Warwood and Knowles, 2004; Sui-Pheng and Khoo, 2001; Pheng, 2001; Ho *et al.*, 1995) had been popular among TQM professionals for some years (Ho *et al.*, 1995). 5-S stands for the Japanese words Seiri, Seiton, Seisu, Seiketsu and Shitsuki (O'hEocha, 2000). Authors like O'h Eocha(2000) and Warwood and Knowles (2004) cite the English equivalent of 5-S as clear out, configure, clean and check, conform and custom and practice. In spite of its popularity in both Japanese and Western environments the intensity of its research and practice has been only moderate. For example, when TQM is entered as a search criterion in the Emerald Insight library (www.emeraldinsight.com), then the availability of 4,157 articles is indicated. In the same database, when 5-S is entered as research criteria, then only 54 articles are listed. This state prevails despite the fact that the literature reports many benefits from 5-S implementation.

One of the reasons for the poor uptake of 5-S may be due to the absence of any mechanism to measure its performance. Although Ho (1999a) has developed an auditing system to indicate the performance of 5-S, its outputs are not visible in the form of monetary value (Lashley, 1999). Whenever the performance of a facility or model is deemed to add value, its acceptance and adoption are more likely. For example, six sigma concepts became popular mainly due to their large financial impact (Klefsjo *et al.*, 2001). In order to measure the performance of 5-S a financial accounting system tool needs to be used. However, the conventional systems used by the financial accounting professionals cannot be adopted for this purpose. Since, the majority of the inputs and outputs of 5-S programmes are non-financial in nature, the conventional financial accounting systems do not have the facility to portray the intangible inputs and outputs. With this in mind, the research reported in this paper was carried out to achieve the following objectives and goals to:

- identify a system for financially accounting 5-S programmes;
- establish the link between 5-S and programmes like QCs; and
- examine the practicality of using a financial accounting system to measure the performance of 5-S teams.

This research will enable both researchers and practitioners to measure the performance of 5-S teams using financial indicators.

Methodology

The methodology adopted to achieve the objectives and goals of this research is described in this section. A review of the extant literature found an already established link between 5-S and QCs (Ho *et al.*, 1995; Ho and Cicimil, 1996 and Ho, 1999a, b). Because of this connection, it was inferred that the QCFAS that has appeared in Devadasan *et al.* (1999) could be exploited for the financial accounting of 5-S. In order to explore the practical feasibility of adopting the QCFAS for financial accounting of 5-S, an implementation study was conducted in a unit of a multinational manufacturing company operating in India. During this study, relevant data on the performance of 5-S teams were collected. These data were substituted in the QCFAS to develop financial accounting statements. These statements highlighted the value of the intangible income gained by the organization by means of the 5-S programme. These statements were then presented to the facilitator of the 5-S programme and his remarks about the

QCFAS were gathered. These remarks were encouraging with regards to using the QCFAS for exploring the financial performance of the 5-S programme.

Literature review on 5-S

In short the 5-S concept encompasses the housekeeping phase of continuous improvement (O'hEocha, 2000). The scientific formulation of 5-S concepts was initiated by Takasi Osada (Pheng, 2001) and subsequently enjoyed significant popularity in Japanese companies (Ho *et al.*, 1995).The researchers who studied the implementation of continuous improvement principles like TQM and Total Prodcutive Maintenance (TPM), found that these programmes implicitly and explicitly encompassed 5-S principles. For example, Pheng (2001) and O'hEocha (2000) pinpointed the inclusion of 5-S principles in all the clauses of ISO 9001:2000. There is agreement over the steps to be followed to implement 5-S in organizations. Particularly, it is suggested that a 5-S programme has to be initiated by forming teams headed by champions/leaders (Warwood and Knowles, 2004; Ho, 1998). This champion/leader implements the 5-S programme by following the steps given below:

(1) get top management commitment (Ho, 1999a; O'hEocha, 2000);

(2) educate all about 5-S (Sui-Pheng and Khoo, 2001; Ho and Cicimil, 1996; O'hEocha, 2000);

(3) draw up a promotional campaign (Ho and Cicimil, 1996; O'hEocha, 2000; Sui-Pheng and Khoo, 2001; Ho, 1999a);

(4) keep records (Ho and Cicimil, 1996; Ho, 1999a);

(5) Impart 5-S training for implementation (Ho and Cicimil, 1996; O'hEocha, 2000);

(6) evaluate the 5-S programme (Ho and Cicimil, 1996; Ho, 1999a; O'hEocha, 2000); and

(7) devise ways for updating the system (Sui-Pheng and Khoo, 2001; Ho and Cicimil, 1996).

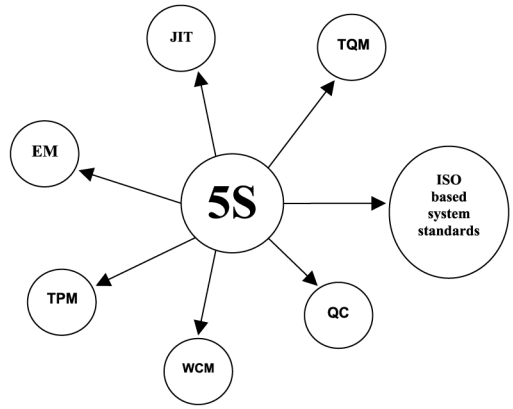
Interweaving power of 5-S

During the past four decades, the world community experienced the evolution of revolutionary paradigms such as QCs, TQM, business process reengineering (BPR), just-in-time (JIT), Kaizen, Kanban and TPM (Warwood and Knowles, 2004; O'hEocha, 2000). Some of these are today regarded as world-class manufacturing strategies (O'hEocha, 2000; McKone *et al.*, 2001; Yamashina, 2000). However, they failed to achieve the desired goals when they were applied together. This is due to the existence of incompatibilities among them. Now this deficiency is overcome since researchers have established that 5-S is capable of interweaving several world-class manufacturing strategies along with system standards of ISO. This aspect is depicted in Figure 1. The supporting literature is enumerated in Tabe I.

Benefits, barriers and imperativeness of 5-S: a literature perspective

Previous studies (Ho, 1999a, b; Warwood and Knowles, 2004; Ho and Cicimil, 1996) have reported numerous benefits as well as barriers to implementing 5-S. (Tabe II)

The literature also reveals that monitoring and evaluation of 5-S programmes has to be done at regular intervals to maintain and improve its performance



ISO : International Organisation for Standardisation.

TQM : Total Quality Management.

QC : Quality Circles.

WCM : World Class Manufacturing.

TPM : Total Productivity Maintenance.

JIT : Just In Time.

EM : Environmental management

Figure 1.
Links of 5-S with modern paradigms

Aspect	Literature evidence
5-S interweaving TQM and JIT	5-S was found to be a foundation for JIT and subsequently TQM in a case study reported by Ho (1999a)
5-S and QCs	5-S is suggested as foundation for the successful conduct of QCs by Ho (1997) and Ho (1999a, b)
5-S and TPM	5-S is found to be the prelude to TPM programme (Warwood and Knowles, 2004)
5-S and ISO 9000, ISO9001	5-S is found to serve as the basic program of ISO 9000 and ISO9001: 2000 certification (Ho, 1999a, b; Ho *et al.*, 1995; Pheng, 2001;Warwood and Knowles, 2004)
5-S and ISO 14000, ISO14001	Since, 5-S envisages neatness and cleanliness in the organization, getting ISO 14000 and ISO14001certification is made easy. (Ho, 1999a, b; O'hEocha, 2000; Warwood and Knowles, 2004)
5-S and Industrial management	Ho (1998) has claimed that 5-S possesses the potential to improve Industrial management process

Table I.
Links of 5-S with modern paradigms

Benefits	Barriers
Improved staff involvement and total participation (Ho and Cicimil, 1996; Ho, 1997; Sui-Pheng and Khoo, 2001; Warwood and Knowles, 2004; Ho, 1998)	Management structure (Warwood and Knowles, 2004)
Fast retrieval of items (O'hEocha, 2000; Ho *et al.*, 1995; Warwood and Knowles, 2004)	Perceived loss of control by management (O'hEocha, 2000; Warwood and Knowles, 2004)
Better house keeping (O'hEocha, 2000)	Lack of planning (Warwood and Knowles, 2004)
Waste reduction (O'hEocha, 2000)	Limited resources (O'hEocha, 2000; Warwood and Knowles, 2004)
Pollution prevention (O'hEocha, 2000)	Space (O'hEocha, 2000)
Safer storage of substances and materials (Warwood and Knowles, 2004)	Poor communications (O'hEocha, 2000)
Better health and safety standards (O'hEocha, 2000)	Lack of feedback (Warwood and Knowles, 2004)
Lead times and cost (Ho and Cicimil, 1996)	Employee attitudes (O'hEocha, 2000; Warwood and Knowles, 2004)
Less environmental risk (O'hEocha, 2000; Warwood and Knowles, 2004)	Personality clashes at shop floor (O'hEocha, 2000; Warwood and Knowles, 2004)
Smoother workflow (Warwood and Knowles, 2004)	Lack of recognition (O'hEocha, 2000; Warwood and Knowles, 2004)
Time saving (Ho *et al.*, 1995)	Low morale (O'hEocha, 2000; Warwood and Knowles, 2004)
Effective action through teamwork (Ho, 1999a, b; Warwood and Knowles, 2004; Ho, 1998)	Low incentive (O'hEocha, 2000; Warwood and Knowles, 2004)
Promote improved communication (O'hEocha, 2000; Ho *et al.*, 1995)	
Safety and working environment (O'hEocha, 2000; Ho, 1997; Warwood and Knowles, 2004)	
Improved quality and efficiency (Ho and Cicimil, 1996)	
Store accuracy and productivity (Ho, 1999a; Warwood and Knowles, 2004)	
Culture and behavioral change (O'hEocha, 2000; Bryar and Walsh, 2002)	
Visual improvement (Ho, 1998).	
Customer awareness (Ho and Cicimil, 1996)	
Disciplined approach (Ho, 1998)	

Table II.
Benefits and barriers of 5-S

(O'hEocha, 2000; Ho and Cicimil, 1996; Ho, 1999a; Sui-Pheng and Khoo, 2001). In addition to that, the need for assessing and evaluating communication methods and their effectiveness is emphasized (O'hEocha, 2000). The success and failure of 5-S depends upon the firm's culture, communication and employee attitudes (O'hEocha, 2000; Ho, 1999a; Warwood and Knowles, 2004). Lack of communication leads to poor performance due to employees being less motivated and, enthusiastic (O'hEocha, 2000). To ensure good communication within the organization, its performance has to be highlighted. This is possible only if a suitable performance measuring system is employed for this purpose. However, apart from the 5-S auditing systems reported by O'hEocha (2000) and Ho(1999a, b), no literature was found that dealt with the performance measurement system for a 5-S programme. Interestingly, among reasons cited for the reluctance of Western organizations to adopt 5-S was that it demanded heavy financial investment (Warwood and Knowles, 2004). However, a number of

papers have reported that the benefits of 5-S (see Tabe II) also include financial benefits (Warwood and Knowles, 2004; Ho and Cicimil, 1996 and Ho *et al.*, 1995).

Although, the literature reports the capability of 5-S in delivering the benefits which would ensure the business prosperity of organizations, no literature has examined the method of evaluating its financial performance. Since, the language of money is found to be powerful (Lashley, 1999), the reluctance towards implementing 5-S activity may be overcome by measuring and reporting its financial impact. In this context, QCFAS was adopted for measuring the performance of 5-S activities. As mentioned earlier, QCFAS has been adopted due to the absence of an exclusive financial accounting system for 5-S and due to the established links between 5-S and QCs. The unique feature of QCFAS is the incorporation of conversion models for the financial accounting of intangible activities.

Tangible and intangible performance measures of 5-S teams

In order to portray the performance of 5-S through financial accounting statements, it is necessary to identify any expenditure and income associated with the programme. But, the peculiarity of expenditure and income of 5-S is that they assume both tangible and intangible forms. A careful study of the steps for implementation enumerated under the section entitled "5-S: Its characteristics and implementation" would indicate that the tangible expenditure of 5-S teams includes the rental costs of meeting rooms, refreshments, experimentations, stationary for preparing reports, presentation materials, expenditure for rewards and other consumable materials (Devadasan, *et al.*, 1999). As many of these tangible expenditures appear to be very negligible, 5-S and financial accounting professionals rarely take account of them. The fact is that, on carrying out various 5-S activities and conducting a number of 5-S meetings, the tangible expenditures can increase greatly over time.

Intangible expenditures of 5-S include usage of employees' service hours, the loss of units of production, and physical disturbance such as disruption of services due to the absence of employees. Intangible incomes of 5-S include ideas generated and enhanced motivation (Ho and Cicimil, 1996). shows the consolidation of these incomes reported in the literature:

- Ideas (Ho and Cicimil, 1996; Sui-Pheng and Khoo, 2001).
- Motivation of employees (O'hEocha, 2000; Ho and Cicimil, 1996).
- Enthusiasm of employees (Warwood and Knowles, 2004).
- Work culture of employees (Warwood and Knowles, 2004).
- Communication of employees (O'hEocha, 2000; Ho, 1999a; Sui-Pheng and Khoo, 2001).
- Positive attitude of employees (O'hEocha, 2000).
- Awareness (O'hEocha, 2000).
- Decision making ability of employees (Bryar and Walsh, 2002; Ho *et al.*, 1995).
- Creativity of employees (Ho and Cicimil, 1996; Ho, 1999b).
- Self discipline (Ho and Cicimil, 1996; Sui-Pheng and Khoo, 2001; O'hEocha, 2000; Ho and Cicimil, 1996; Warwood and Knowles, 2004).
- Team work of employees (Warwood and Knowles, 2004; Ho, 1998).

- Initiative of employees (O'hEocha, 2000).
- Work performance of employees (Warwood and Knowles, 2004).
- Quality of worklife of employees (Warwood and Knowles, 2004; Ho, 1999a, b).

Quite interestingly these elements closely tally with the elements of business success reported by Dobbins and Pettman (1997). Also the financial benefits of running a 5-S programme in monetary terms are reported in the literature in a scant manner (Ho and Cicimil, 1996 and Warwood and Knowles, 2004). This implies that a successful 5-S programme is prone to improve business performance. A 5-S programme will also create assets including management and union support. 5-S programmes will also result in liabilities such as capital investment, cash deficits and reward payments.

Financial conversion models of intangible transactions

The financial accounting of the tangible expenditures can be carried out using conventional financial accounting procedures. This is not so in the case of intangible expenditures, because the values of these intangible expenditures are not readily available in financially accountable form. Hence, before financially accounting the intangible expenditures of 5-S, their financial values should be determined using suitable models (Devadasan *et al.*, 1999). Four approaches are available for converting the intangible income of 5-S activities. These approaches are termed as the individual sales price approach, the turnover basis approach, the average sales price approach and the average employee salary approach. Of all these approaches, the average employee salary concept is considered to be the most feasible and general approach for converting the intangible activities of 5-S into financial values. Hence, financial conversion models that are developed using this approach can be used to financially account 5-S programmes. In the following subsection, the model used for converting the communication capability gained by a member of a 5-S team into financial values are presented (Devadasan *et al.*, 1999).

Communication account

If the performance of the 5-S team is good, it will inculcate communication skills among the members. However, the communication skills to be absorbed by the 5-S team members (Ho, 1999a; O'hEocha, 2000) will be at different levels. This aspect is depicted in Tabe III.

The methodology of converting the communication skills exhibited by the 5-S team members into financial values is shown in Figure 2.

This methodology is shown by presenting the following example.

For example, let us consider a company in which the average monthly salary of an employee is 8,000 Indian Rupees (INR). Let us further assume that a member by name "X" exhibits excellent communication skills after participating in the 5-S programme. After the commencement of the 5-S team activities, the facilitator of "X" observes the communication ability of "X". The facilitator reports that "X" has earned the maximum allocated points (that is five) based on the procedure shown in the Figure 2.

The financial value added by "X" by demonstrating improved communication skills in this case is INR 400/- (that is, 5 points $\times$ 1/100 $\times$ INR 8000 = INR 400). The journal entry procedures followed in traditional accounting systems are then adopted

Table III.
Financial conversion of communication skills gained through 5-S participation

Serial number	Reaction	Nature of reaction	Points allotted	Responsibility
1	Communicating orally ideas and suggestions	Coming forward to pronounce ideas and suggestions during meetings	Each time a person comes forward, one point is allocated subject to a maximum of six points	5-S team members
2	Addressing the gathering	With out supporting material With supporting material	2(subject to a maximum of four points) 1	5-S team members

The above evolution should be made over a span of four meetings; total: ten points; value of each point = 0. 5 per cent of average salary/employee/month

for financially accounting the performance of 5-S teams. The postings according to the journal entry rules in the appropriate accounts are shown in Figure 2.

5-S in Grindwell-Norton

The financial accounting of 5-S teams using QCFAS was studied in a European multinational company called "Saint Gobain". Products such as glass, abrasives, ceramics and fibres are manufactured at Saint Gobain. The study reported here was conducted in one of the units of Saint Gobain which is located in Bangalore city, India. In this unit, abrasives are manufactured. The name of the unit is Grindwell-Norton. Grindwell-Norton is the world's largest manufacturer and market leader in abrasive products. Grindwell-Norton comprises three plants namely the Coated Disc Plant, the Non Woven Abrasive Plant and the Super Abrasive Plant. About 95 per cent of its products are sold in India while about 5 per cent are exported to Europe, Africa and

Journal entry:

		INR	INR
6.01.2005	'X' account .....Dr.	400	
	To Communication account		400

Account heads:

X's account

Dr.			Cr.
Date	INR		
6.01.2005 To Communication account	400		

Communication account

Dr.			Cr.
		Date	INR
		6.01.2005 By X's account	400

Figure 2.
Sample journal entry and posting in accounts for the communication skill gained by 5-S team member

the USA. In pursuit of excellence and world class quality various quality tools have been implemented in Grindwell Norton.

First was 5-S in 1995, followed by a quality program called IMPACT (IMProvement through ACTion) and then six sigma.

The organizational structure of Grindwell Norton comprises administrator, facilitator, staff in-charge, supervisor, team leader and team members. Each team member is assigned their roles and responsibilities in achieving the goal of the organization. The facilitator is assigned the responsibility of monitoring and evaluating the 5-S programme. The staff in-charge is responsible for assisting the facilitator towards the smooth conduct of the 5-S programme and to act as a coordinator. The supervisors of the production and maintenance department assist the staff in-charge in accomplishing the task. The team leaders are responsible for training the team members and getting the work done. To improve comradeship within the team and better employee-employer relationship, Grindwell-Norton has adopted the following practices. Everyday, before beginning every shift, each member of the team, irrespective of his/her rank, takes part in a 5-S pledge. This practice aims to raise team morale and improve personal relationships. This is followed by a 10-minute 5-S activity period, during which every 5-S team member cleans a specific portion of the workplace allotted to him/her. After this, the routine work is started. Once every six months, a five day 5-S workshop, called Blitz-Kaizen Workshop (BKW) is held to forge better personal relationships and significantly improve the working environment. At the end of the workshop, the 5-S team that has provided the best solutions for the problems encountered during the previous six month period is awarded a trophy and each member receives a certificate.

Performance analysis of 5-S teams at Grindwell-Norton

Nine 5-S teams exist in Grindwell-Norton's three plants. Data collection was the first phase of the activity carried out to study the financial accounting of 5-S using QCFAS at Grindwell Norton. First, the data concerning a 5-S team called "Diamond" were collected from past records and by interviewing the 5-S facilitator and team members. Initially the proposed methodology to convert the intangible benefits into monetary values was explained to the 5-S facilitator, team leader and members. The details regarding the expenditures for conducting the 5-S programme were collected from the records maintained by the 5-S facilitator. For example, expenditures regarding the conducting of an awareness programme, launching of the 5-S, fees paid to consultants, management presentations, etc. The expenses for conducting the regular meetings were calculated based on the salary paid to the 5-S team members and the leader. All the remaining expenditure details were collected by interviewing the 5-S team members.

After completing the data collection on the performance of the Diamond team, the same procedure was followed with regard to the performance of the other eight 5-S teams. The intangible data collected were converted into financial values and posted in ledgers. Then the trial balances pertaining to all the 5-S teams were drawn up. The profit and loss account and balance sheets pertaining to the functioning of these nine 5-S teams were developed. As a sample, the trial balance, profit and loss account and balance sheet of diamond 5-S team are shown in Tabes IV-VI.

Serial number	Account	Debit (INR)	Credit (INR)
1	Motivation		7,091.25
2	Initiative		232.50
3	Enthusiasm		2,208.75
4	Awareness		372.00
5	Work culture		3,255.00
6	Self discipline		24,180.00
7	Communication		2,266.87
8	Positive attitude		871.88
9	Creativity		2,906.25
10	Decision making		3,371.25
11	Team spirit		5,347.50
12	Work performance		3,022.50
13	Quality of work life		5,115.00
14	Ideas		3,720.00
15	Cash tangible		13426.00
16	Cash intangible		29,634.69
17	Employee perception	–	
18	Management support	17,670.00	
19	Union support	11,625.00	
20	Man hours	339.69	
21	Total running expense	13,426.00	
22	Capital		2,906.25
23	M 1	9,433.69	
24	M 2	9,346.50	
25	M 3	7,312.12	
26	M 4	7,777.12	
27	M 5	6,265.87	
28	M 6	9,753.37	
29	M 7	7,864.31	
30	M 8	6,207.75	
31	System value	2,906.25	
		109,927.69	109,927.69

Table IV.
Trial balance of diamond 5-S team as on date 6 January 2005

Results and analysis

The financial accounting documents shown in Tabes IV-VI were analyzed and the following interpretations were derived:

- As shown in the profit and loss account (Tabe V), the total running expenses for conducting the Diamond 5-S team activities was INR.13, 426. However, the cost of man-hours spent for this purpose was only INR 339.69. The 5-S facilitator is required to explore the reasons for the high running expense incurred while conducting 5-S team activities.
- As shown in the profit and loss account, the maximum income (INR 29,634.69) was obtained through the self-discipline of the members. However, the income obtained was very low (that is only INR 232.50) in the case of employee initiative. The 5-S facilitator may have to investigate and determine the reasons for this low gain.

Serial number	Account	Expense (INR)	Income (INR)
1	Total running expenses	13,426.00	
2	Man hours	339.69	
3	Motivation		7,091.25
4	Initiative		232.50
5	Enthusiasm		2,208.75
6	Awareness		372.00
7	Work culture		3,255.00
8	Self discipline		24,180.00
9	Creativity		2,906.25
10	Positive attitude		871.88
11	Communication		2,266.87
12	Decision making		3,371.25
13	Team spirit		5,347.50
14	Work performance		3,022.50
15	Quality of work life		5,115.00
16	Idea		3,720.00
17	Value addition	50,195.06	
		63,960.75	63,960.75

Table V.
Profit and loss account of diamond 5-S team as on date 6 January 2005

Serial number	Liabilities	INR	Assets	INR
1	Capital	2,906.25	System value	2,906.25
2	Cash tangible	13,426.00	Management support	17,670.00
3	Cash intangible	29,634.69	Union support	11,625.00
4			M 1	9,433.69
5			M 2	9,346.50
6			M 3	7,312.12
7			M 4	7,777.12
8			M 5	6,265.87
9			M 6	9,753.37
10			M 7	7,864.31
11			M 8	6,207.75
12	Value addition	50,195.06		
		96,162.00		96,162.00

Table VI.
Balance sheet of diamond 5-S team as on date 6 January 2005

- As shown in the Balance Sheet, the asset of the employee with code M6 is highest with the value INR 9,753.37. This is lowest in the case of the employee with code M8 with the value INR 6,207.75.
- As shown in the balance sheet, management has contributed INR 2906.25 as capital fund and a system to carry out 5-S team activities worth the same amount.
- As shown in both the profit and loss account and balance sheet, the conduct of the Diamond 5-S team has added value equivalent to INR 50,195.06. This amount includes both tangible and intangible values.

As enumerated above, in comparison to the management's contribution towards the capital, the conduct of the 5-S Diamond team has resulted in a significant value addition. On the whole, QCFAS has been found to be a powerful tool in evolving the profit and loss account and the balance sheet which are useful for studying the performance of 5-S teams. The interpretations derived by reading these financial accounting statements could be used for taking corrective actions so that the reluctance factors (Warwood and Knowles, 2004) for implementing 5-S could be reduced.

Validation

The QCFAS model contains propositions with arbitrary values. These arbitrary values have to be confirmed by conducting a validation study. For this purpose, the 5-S facilitator of Grindwell Norton was approached with the financial accounting documents prepared for all nine 5-S teams. Since, he lacked knowledge on financial accounting statements, he could not comprehend the financial accounting statements and react to them. Hence, the incomes of 5-S teams in INR were entered in MS excel software and the bar diagram showing the incomes of each 5-S teams were developed. As a sample, the chart developed pertaining to the 5-S Diamond team is shown in Figure 3. These charts enabled the facilitator to understand the aspect of financial accounting of 5-S teams.

On seeing these bar charts, the 5-S facilitator reported the following:

> We (5-S team members of Grindwell-Norton) found the results and conclusions acceptable and convincing. The model covered every detail, but has to be customized for each company. However, the model wasn't perfect, having some minor flaws. We found that the model was highly subjective in nature. This personal view-point of each worker cannot be obtained easily, especially within the short duration of one month. Also, the model depends largely on the team's structure. The higher the hierarchy involved in the team, the greater is the income generated. Apart from these few minor details, the model gave a fairly realistic picture of what is going on at the workplace. We at Grindwell-Norton, accept the model and its conclusions to be valid regarding our company.

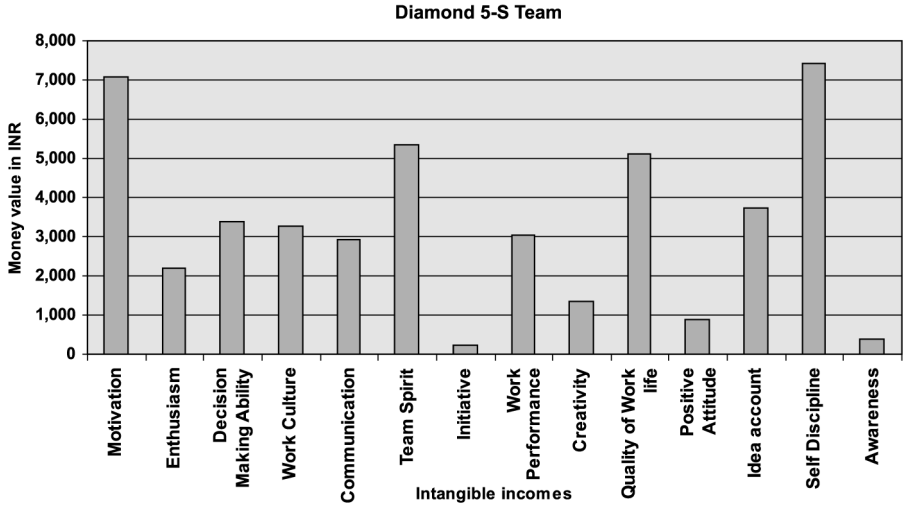


Figure 3.
Intangible incomes of diamond 5-S team

The above statement indicates that, the performances of the depicted 5-S teams using the QCFAS are reasonably agreeable to the 5-S team members of Grindwell-Norton. Therefore, the practical validity of QCFAS for financially accounting 5-S programme is ensured to a significant extent.

Conclusion and recommendations

The emanation of TQM has resulted in the evolution of many revolutionary techniques and principles (Ho *et al.*, 1995; Pheng, 2001). Two of them are QCs and 5-S. These two concepts facilitated organizations to garner intangible benefits to a great extent. Since, traditional financial accounting systems focus mainly on tangible accounting features, the top management, CEO and executives are seldom able to visualize thoroughly the financial impact of concepts such as QC and 5-S. In this context, this paper has presented a research work which was accomplished by testing and observing the practical feasibility of using QCFAS for financially accounting 5-S teams. The data on the performance of 5-S teams from Grindwell Norton were gathered. These data were substituted in QCFAS and the financial accounting statements were developed.

The 5-S concept has been found to be the leveraging mechanism for fostering many world class paradigms including QC. Hence, the application of QCFAS for the financial accounting of 5-S would be a powerful proposition. This claim has been found to be valid in practice because the implementation study reported in this paper has shown the practical validity of QCFAS in the financial accounting of 5-S teams and analyzing their performance. Since, the implementation study was conducted only in one multinational manufacturing company, the propositions and inferences presented in this research paper may have to be confirmed by conducting further studies in this direction and the results being subjected to statistical analysis. Moreover, future researchers may venture into deeper studies and develop an exclusive financial accounting system for 5-S programmes.

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