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Quality improvement oriented training and education programme and its financial accounting system

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Abstract

Purpose – To design a quality improvement oriented training and education programme (Q_TEPS) for a company manufacturing milk products and to explore its performance using a financial accounting system.

Design/methodology/approach – A company manufacturing milk products was visited and the processes were studied. The literature on Q_TEPS was referred to design Q_TEPS unique to the milk product manufacturing company. The feasibility of implementing Q_TEPS in the company was checked by interviewing the executives. A financial accounting system was used to evolve the income and expenditure account and the balance sheet pertaining to Q_TEPS in the company. The feedback collected using questionnaires was used to establish the validity of Q_TEPS and their financial accounting system in the company.

Findings – The implementation of Q_TEPS in the milk manufacturing company would enable the company to reap a considerable number of tangible and intangible benefits.

Research limitations/implications – It being a government run company, test implementing Q_TEPS was not possible. The income and expenditure account and balance sheet were developed by projecting the performance of Q_TEPS in the company. However, this exercise was done with the consultation of the executives in the company and hence the values projected in the above statements may not deviate considerably from the real time performance of Q_TEPS.

Practical implications – The feedback on Q_TEPS and their financial accounting system led to an impression that they can be implemented in practice. However, in order to enable this, the business procedures must be made simple, flexible and friendly to experiment such research programmes in the future.

Originality/value – The literature review indicates that no work has been done on implementing Q_TEPS in a milk product producing company. Also, it is discernable that the performance of

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Q_TEPS has not been viewed using financial values. The contribution of this paper would lead to the attainment of these research and practical imperatives.

Keywords Total quality management, Training, Education, Quality improvement, Accounting, Milk

Paper type Research paper

Introduction

Total quality management (TQM) is one of the philosophies that brought out revolutionary changes in organisations over the last two decades (Gunasekaran *et al.*, 1998). Fundamentally, TQM calls for involvement of all employees and functions towards attaining continuous quality improvement (Cowling and Newman, 1995). In order to achieve this major goal, a number of approaches are envisaged in TQM field. One among them is, imparting training and education to the employees (Brown, 1994; Galloway and Ho, 1996). TQM models suggested by leading quality gurus (Logothetis, 1997; Davies, 2001; Pun and Chin, 1999) lay an emphasis on training and education to achieve continuous quality improvement. As the TQM consultants also advised companies to promote training and educational programmes, money and time have been invested in this direction in practical arena (Sels, 2002). Yet, an overview on TQM programmes being organized in companies reveal that well structured and programmed Quality Improvement Oriented Training and Education Programmes (Q_TEPS) still eludes the practical scenario. The absence of any instrument to measure the performance of Q_TEPS in companies is one of the reasons attributed to this state. The managements of companies in particular, desire to read the performance status of any training programme using balance sheet (Tennant *et al.*, 2002). In order to fulfil these needs, we were motivated to carryout the research project reported in this paper. There were two purposes for carrying out this research project. One was to check the feasibility of designing Q_TEPS and a system to evaluate their performance from the financial point of view. The second purpose was to examine their implementation feasibility in a real time environment. In order to fulfil these purposes, the Q_TEPS for a milk products manufacturing unit located at Kollam District of Kerala State of India were designed and their performance was financially viewed using a financial accounting system. The details of this research project are presented in this paper.

Literature review

Right from quality gurus' era to today's quality awards and ISO 9001 dominated era, the importance of training in exercising continuous quality improvement is strongly emphasized (Niehoff and Whitney-Bammerlin, 1995; Brown, 1994; Quazi and Jacobs, 2004). Researchers have also established the importance of training and education in achieving continual improvement (Govindarajulu and Daily, 2004). Yet the number of articles that have reported the research and practices of Q_TEPS are comparatively less (Mathews *et al.*, 2001). Also, it is claimed that not many companies have been examining the impact of training programmes in TQM projects (Genna, 1998). It is in this context, that the literature review on Q_TEPS reported in the following subsections assumes special significance. Before detailing the contributions, we appraise here the rationale behind selecting Q_TEPS articles. Except Ishikawa and Deming (Logothetis, 1997), many researchers and practitioners have mixed the usage of the terms "training" and "education". Meanwhile Goetsch and Davis (1997) have confirmed that the meanings of training and education in TQM almost coincide with

each other. Hence we reviewed the articles that deal with training or education both separately or jointly in order to report the state of the art of Q_TEPS.

Benefits of Q_TEPS

A considerable number of researchers have reported varied types of benefits of Q_TEPS. Some of them are listed below. They:

- lead to Improved communication (Ciancarelli, 1999);
- help participants acquire knowledge on the fundamentals of TQM, application, synthesise of data and information and evaluation of strength and weakness of TQM pertaining to the unit (Niehoff and Whitney-Bammerlin, 1995);
- provide job skills and knowledge required to attain continuous quality improvement by all the personnel (Brown, 1994);
- act as a vehicle to focus all activities towards achieving the TQM journey (Brown, 1994);
- facilitate the employees and managers in becoming more positive and committed towards their activities related to their respective work (Vermeulen and Crous, 2000);
- improve the employees' confidence and personal development (Tsang and Antony, 2001); and
- increase customer satisfaction, reduces in-line rejection and employee turnover (Kondo, 1993)

A careful study of the above benefits would indicate that Q_TEPS not only enhances workplace learning, but is also useful in nurturing and enhancing human values which is a major aspect of TQM (Gunasekaran *et al.*, 1998).

Q_TEPS frameworks

Although quality gurus have not suggested any framework for Q_TEPS, some researchers have contributed certain structures for this purpose (Miros and Dale, 1996). Among them, Niehoff and Whitney-Bammerlin (1995) are emphatic in suggesting a framework based on "Bloom's Taxonomy". The steps of implementing Bloom's taxonomy are:

- assessment of needs;
- sequencing of activities; and
- targeting the activities to reach all the required levels.

It is appraised that Q_TEPS should facilitate the learning at all the levels of employees. This aspect governs the "totality" aspect of TQM. Oakland and Waterworth (1995) suggest a Q_TEPS framework which imbibes the quality policy of the company and goes through a cyclic process. While these kind of Q_TEPS frameworks provide the guidelines, McCahon *et al.* (1996) point out the different methods of Q_TEPS and their suitability by citing references from literature. They have recommended video-tape method of training for providing realistic situation. They have also claimed that this method creates excitement and sustains audience attention. However, Niehoff and Whitney-Bammerlin (1995) have cited the limitations of video-training. Thus several

frameworks and methods of Q_TEPS have been brought out by the researchers whose features hardly coincide with one another. Hence, it appears that no single Q_TEP model can be chosen as a standard package for application in companies. Rather it is the knowledge of the Q_TEPS coordinator that would facilitate the selection and design of the suitable model. Such model shall be tailor made to meet the needs of the company concerned.

Evaluation of Q_TEPS

While the researchers are divided over the methods of imparting Q_TEPS, many of them have particularly expressed difficulties in evaluating them. Early researchers concentrated on the feedback on technical contents of Q_TEPS (Bedingham, 1997). Contrary to this development, recent researchers have been examining the evaluation of Q_TEPS in terms of financial benefits. The common method of evaluating the Q_TEPS is by using a questionnaire-based survey method (Bedingham, 1997). Sels (2002) provided the levels of evaluation to be employed during Q_TEPS. In this direction, an opinion survey was conducted by Palo and Padhi (2003). The primary aim of this survey was to evaluate the implications of Q_TEPS. They have indicated that Q_TEPS have so far not been effective in reducing the stress level of people or increasing customer satisfaction. However, these authors have not tried to study the evaluation of Q_TEPS from the perspective of business performance. Meanwhile researchers like Sels (2002) have pointed out the huge investment made on Q_TEPS and the need for developing an evaluation system that would explain the performance of Q_TEPS in terms of money values. This author has also suggested an approach for measuring Q_TEPS using the percentage of labour cost.

Managerial implication of Q_TEPS in business world

The evolution of TQM principles was paralleled by the emphasis on the implementation of Q_TEPS (Pun and Chin, 1999). This emphasis created major changes in the attitude of the minds of business community. After the business world started showing interest in the TQM philosophy, Q_TEPS became a dominant activity in companies (Kondo 1990; Patel, 1994). TQM consultants proliferated during this period (Roxin, 1992). Even companies with minimum turnover began to have their own training and education cells (Niehoff and Whitney-Bammerlin, 1995). Companies invested their time and money considerably in Q_TEPS (Motwani *et al.*, 1994; Ashton, 1994). After the introduction of ISO 9000 series quality system standards, this kind of momentum on Q_TEPS witnessed higher acceleration. For example, Quazi and Jacobs (2004) after studying a sample of 33 Singapore companies report the high quantum of ISO 9000 training programmes and the corresponding financial amount spent. Even as Q_TEPS propagated and began anchoring in companies, certain concerns emerged regarding their evaluation. In fact, time and again, both theoreticians and practitioners brought out certain propositions and mechanisms to evaluate the performance of Q_TEPS (Kathman and Kathman, 2000; Motwani *et al.*, 1994). It has become a common practice to distribute the feedback questionnaire to the participants and analyse the performance (Mulder, 2001; Bedingham, 1997) of the Q_TEPS (Goetsch and Davis, 1997). These kinds of mechanisms facilitate the performance improvement of Q_TEPS. However, these mechanisms help very little in checking the financial viability of Q_TEPS. Barring the non-profit oriented organizations, assessment of financial

viability is a vital requirement because the performance and survival of the business houses depend upon their financial stake in the market situation. This helps us understand the importance of measuring the financial performance of Q_TEPS in TQM projects. Considering this factor, it was necessary to examine the practicality of Q_TEPS and its financial accounting system in the business scenario.

Methodology

The methodology adopted is shown in Figure 1. As shown the literature was studied to gather knowledge on training and education. The literature was then refined to extract Q_TEPS requirements. The milk products manufacturing unit (hereafter referred to as "company") was visited and the products and the manufacturing processes were studied parallely. At this juncture, both the theoretical and practical knowledge gathered were used to identify the Q_TEPS requirements of the company. In order to meet these Q_TEPS requirements, the detailed design of Q_TEPS for the company was carried out. A literature search was made to identify a suitable performance model of Q_TEPS. At one point of time, it was decided to use a financial accounting system used by Devadasan *et al.* (1999) for portraying quality circle programme through financial accounting statements. Then, the financial values pertaining to the tangible activities of Q_TEPS in the company were computed. In addition to this, the intangible activities of Q_TEPS were identified and the conversion models were used to convert them into financial values. Following this, the income and expenditure account and balance sheet of Q_TEPS for the company were developed. A questionnaire-based feedback method was used to derive the opinions among the practising community on the Q_TEPS and its financial accounting system.

Manufacturing of milk products

The milk products produced by the company are toned milk, ghee, curd and buttermilk. The processes employed for manufacturing these milk products and their sequence are shown in Figure 2. As shown the milk received from different agencies is chilled to 4°C to avoid spoilage. In order to prevent the growth of bacteria, it is pasteurised. This process involved the heating of chilled milk to 80°C and cooling it to a temperature of 8°C. During the pasteurisation process, the cream is separated from the milk at about 40°C in the cream separator. The cream thus separated is used for manufacturing ghee and skimmed milk. Curd is prepared in a jacketed tank by collecting milk directly from the pasteurizer at 37°C. The milk entering the pasteurizer is heated to 90°C and then cooled to 37°C using normal water. Culture is then added and it turns into curd, left overnight. The buttermilk is prepared by diluting the curd with pasteurized water, thus maintaining a total solid content of 4.5 per cent and by adding salt, ginger juice, chilly juice, curry leaves, etc. The quality threats of milk production and processes are:

- spoilage of the products at different stages; and
- packaging with incorrect weight and leaks in packets.

Design of Q_TEPS

Before beginning the design, the literature dealing with general training and Q_TEPS were studied to enlist the topics (Frances and Bee, 2000; Logothetis, 1997). Those topics are shown in Table I. As shown, as many as 18 topics of Q_TEPS were identified.

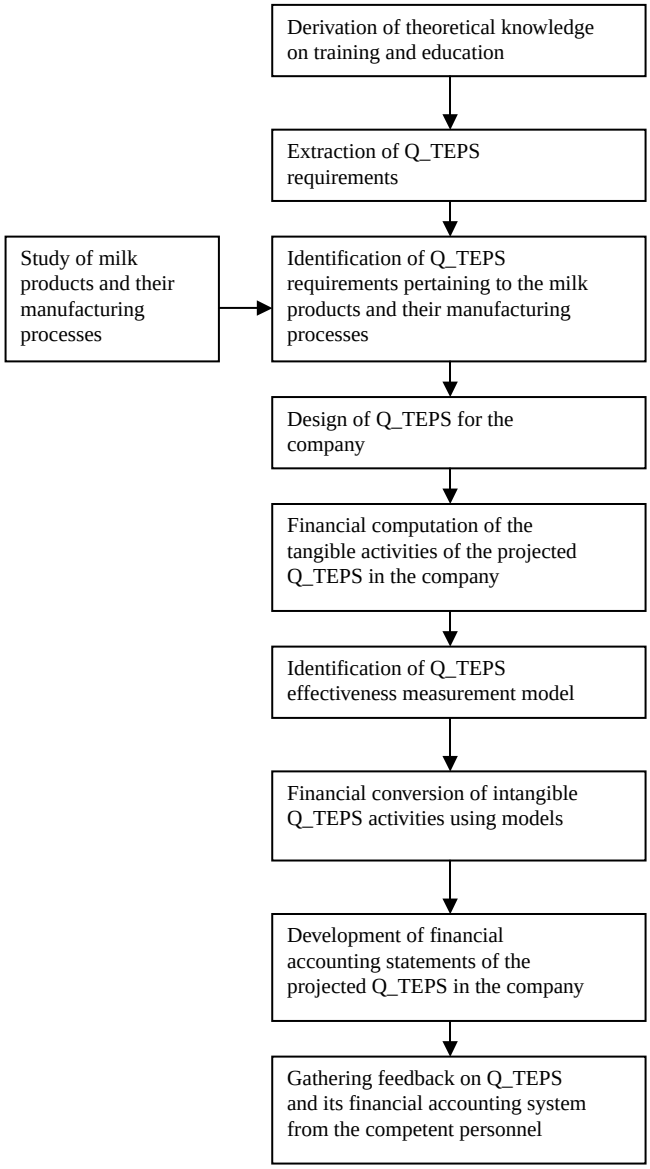

Figure 1.
Methodology

Following this process, the inputs and outputs of the 18 Q_TEPS were drawn. These are shown in Table II. In order to deal with 18 Q_TEPS topics, the specific and detailed training programmes were designed. The detailed design pertaining to the topics "Quality planning for process control", "Cost of poor quality-how to estimate it" and "Corrective action for nonconformities" carried out in the company are presented in Tables III-V, respectively, as samples. The details of the design pertaining to "Quality

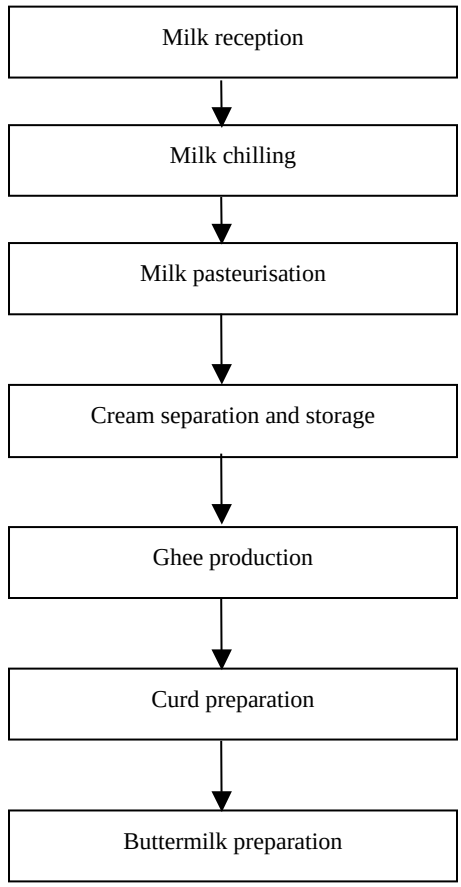

Figure 2.
Processes employed for manufacturing milk products

planning for process control" is briefly described here. As shown in Table III, this Q_TEP topic is made specific to the company by assigning the title "Quality planning for process control for handling loss minimisation". The programme schedule is drawn to include lectures and interactive sessions. The capacity and the designation of the participants are mentioned. The maximum capacity of this programme is 53 operators and 7 supervisors. The expected output is also declared which will direct both the participants and the organisers of Q_TEPS focus towards covering the Q_TEP topic. The detailed design of all the 18 Q_TEPS topics for the company were carried out theoretically and then refined after consulting the key knowledgeable personnel employed in the company. Thus the practical compatibility of Q_TEPS designed for the company was ensured. However, their successful implementation would depend upon their performance resulting in enhanced financial values. This implied that financial evaluation of Q_TEPS is instrumental in preventing the derailment of the management's main agenda.

Topic number	Topics
1	Quality of communication
2	Quality planning for process control
3	Cost of poor quality: how to estimate it
4	Corrective action for non-conformities
5	Quality council and its responsibilities
6	Quality assurance audits
7	Methods of gathering competitor's information
8	Quality maintenance of books and records
9	Quality in marketing
10	Quality through societal contribution
11	Customer training towards quality
12	Attitudes towards quality
13	Impact of quality on labour turnover and absenteeism
14	Training on quality manual improvement and development
15	Quality improvement oriented performance appraisal system
16	Quality through use of technology
17	Quality through safety training
18	Quality through raw material procurement

Table I.
Topics of Q_TEPS

Financial accounting of Q_TEPS

The task of financial evaluation of Q_TEPS begins with identifying of a suitable model. If a completely new financial evaluation model for Q_TEPS is developed, it will take a considerably longer time to penetrate the organisational environment. In this context, attention is drawn towards the system used by financial accounting professionals (Porter and Norton, 1999). This conventional financial accounting system is being used in companies for a prolonged period of time and is found to successfully account the organisational performance through the language of money. If the same system is exploited, the receptivity and utility of the financial accounting system of Q_TEPS in TQM projects will be ensured. Such a system should evolve financial accounting statements namely "Income & Expenditure account" and "Balance Sheet" concerning Q_TEPS in TQM projects. As the practicing professionals are accustomed to assessing the financial performance of the companies using the traditional financial accounting system, the income and expenditure account and balance sheet concerning Q_TEPS in TQM projects would be useful for decision making.

Expenditure and income of Q_TEPS

Both the expenditure and income of Q_TEPS can be categorised into tangibles and intangibles. The tangible expenditures include the hall rent for conducting meetings, refreshments, experimentation set-up, stationary for preparing reports, presentation materials, expenditure for rewards and other consumable materials, etc. (Fitz-enz, 1987). As most of the tangible expenditures appear to be very negligible, very rarely do both Q_TEPS and accounting professionals show interest in accounting them seriously. The fact is that with the accumulation of various activities, which includes the conduct of a number of meetings, there is a phenomenal growth in tangible expenditures. Moreover, accounting the tangible expenditures would be helpful while trying to financially account Q_TEPS performance. Intangible expenditures of Q_TEPS include the service hours of employees lost, production loss and physical

Table II.
Inputs and outputs of Q_TEPS

Serial number	Q-TEPS needs	Input	Expected outcome
1	Quality of communication	One day seminar on communication	Better cooperation among the staff, suppliers and customers Communication of activities enabling continuous quality improvement at fast rate without aberration
2	Quality planning for process control	One day training	Employee capability on effective utilization of tools and devices
3	Cost of poor quality: how to estimate it?	One day programme for executives, one day programme for middle level and one day programme for operators to educate and train them to gather and use quality cost data	Employees become quality cost conscious Creation of leaders who will be capable of conducting quality cost studies
4	Corrective action for non-conformities	Half a day seminar for all On the job training	Error free quality system which facilitates continuous quality improvement Both managers and employees learn their responsibilities and authorities
5	Quality council and its responsibilities	One day educational programme for all	Organisation is set to march towards quality mission, vision, and policy
6	Quality improvement oriented performance appraisal system	One day training for executives	Development of skills for performance appraisal for achieving quality improvement Knowledge deficiencies can be eliminated
7	Quality assurance audits	Two day seminar for internal quality auditors	Elimination/reduction of non-conformities
8	Methods of gathering competitors information	One day programme for marketing personnel	Understanding the company's status in the target market
9	Quality maintenance of books and records	One day training for accounting professionals and quality auditors	Information on quality at any time Instant access to data on continuous quality improvement
10	Quality in marketing	One day educational programme for marketing personnel	Increase in sales Increase in customer domain Reduction in purchase return

(*continued*)

Serial number	Q-TEPS needs	Input	Expected outcome
11	Quality through Societal contribution	Appraisal programme to a mixture of employees and public residing nearer to the company	Society gets the benefits of running the company
12	Attitudes towards quality	One hour refresher course every week to both employees and management through out the year	Attitudinal change of both employees and management towards continuous quality improvement
13	Quality through the use of technology	Training and educational programmes of varied duration to suit the technological requirements	Technological up gradation and corresponding improvement of skills of employees aiming to achieve continuous quality improvements
14	Impact of quality in labour turnover and absenteeism	Educational pragrammes on the connectivity between quality and labor turnover and absenteeism	Reduction/elimination in absenteeism and labour turnover leading to labour cost reduction
15	Training on quality manual improvement and development	Training management representatives and quality auditors	Quality system gets tuned towards achieving continuous quality improvements
16	Quality through safety training	One day educational programme for executives One day training for operators	Elementary reduction in accidents, equipment downtime, etc. leading to reduction in quality costs
17	Customer training towards quality	Selection of customers and imparting one day training towards quality	Number of customer complaints can be reduced Customer satisfaction can be improved Number of customers increases Increase in sales
18	Quality through raw material procurement	One day education and training programme for material management professionals	Improve the skills of the staff dealing with the procurement of raw materials

Table II.

Table III.
Q_TEP on "Quality planning for process control for handling loss minimisation"

One day training on "Quality planning for process control for handling loss minimisation" Program schedule	
9.00-9.30 a.m.	Introduction Need of communication
9.30-9.40 a.m	Tea break
9.40 a.m.-12.40 p.m	Lecture on need of handling loss minimization Lecture on how to handle the product effectively so as to minimize spoilage or breakage
12.40-1.30 p.m.	Lunch break
1.30-2.30 p.m.	Interactive session
2.30-3.30 p.m.	Questionnaire distribution and feedback collection
Number of operators (o)/workers (w)/ supervisors (s)	53(w) + 7(s)
Expected outcome	Handling loss can be minimised from 0.5 to 0.3 per cent

Table IV.
Q_TEP on "Cost of poor quality: How to estimate it to reduce the total quality cost/purchase returns"

One day training program on "Cost of poor quality: How to estimate it to reduce the total quality cost/purchase returns" Program schedule	
9.00-9.30 a.m.	Introduction
9.30-9.40 a.m	Tea break
9.40 a.m.-12.40 p.m	Lecture on cost of poor quality Lecture on how to reduce total quality cost Lecture on spoilage / leakage and quality cost
12.40-1.30 p.m.	Lunch break
1.30-2.30 p.m.	Interactive session
2.30-3.30 p.m.	Questionnaire distribution and feedback collection
Number of operators (o)/workers (w)/ supervisors (s)	4(o) + 10(w) + 7(s)
Expected outcome	Employees become quality cost conscious and the purchase returns can be reduced

Table V.
Q_TEP titled "Corrective action for non-conformities to keep the quality of butter milk"

Half a day Seminar on "Corrective action for non-conformities to keep the quality of butter milk" Program schedule	
9.00-9.30 a.m.	Introduction
9.30-9.40 a.m	Tea break
9.40 a.m.-12.40 p.m	Lecture on importance of error free quality systems Lecture on positive attitude
12.40-1.30 p.m.	Lunch break
1.30-2.30 p.m.	Interactive section
2.30-3.30 p.m.	Questionnaire distribution and feedback collection
Number of operators (o)/workers (w)	5(o) + 5(w)
Expected outcome	Error rates can be reduced

disturbance such as disruption of services due to the absence of employees. The intangible expenditures are carefully converted into financial values using appropriate mathematical models.

The major tangible income of Q_TEPS is the savings in money due to the faultless working of employees (Goetsch and Davis, 1997). Besides tangible income, Q_TEPS lead to a number of intangible income which includes:

- generation of innovative ideas;
- co-operation of employees with management;
- enthusiastic involvement in work;
- healthy work culture;
- positive attitude of employees;
- enhanced creativity of employees;
- increased motivation; and
- development of learning culture among employees (Vermeulen and Crous, 2000).

Accounting intangible income appears to be an impossible task. At this juncture, it is pointed out that in financial accounting field, a methodology is adopted to financially account the image of the company under the account head "goodwill" (Williams *et al.*, 2004). A similar approach is required to account intangible income of Q_TEPS. However, due to the absence of any model to convert intangibles into financial values, financial accounting of the intangible income of Q_TEPS seems to be a challenging task.

Financial conversion of Q_TEPS activities

As mentioned in the previous section, a majority of the Q_TEPS activities, particularly, expenditure, gains, assets accumulation, and increasing liabilities take place in intangible forms. In order to financially account these activities, it is important that they are appropriately converted into financial values. To achieve this purpose, four approaches were considered. These approaches are briefly described here.

Individual sales price of product

According to this approach, the Q_TEPS task, which aims at solving the problem of a model or brand of the company's product, should be considered as the basis. Here, the Q_TEPS related to the product whose price is higher will be awarded higher financial values and the one related to the product, whose price is lesser, the activities will carry lesser financial values. The advantage of this approach is that the management will be tempted to encourage the activities that would result in better financial return. At the same time it suffers from a disadvantage – that is, a product with lower value but higher turnover may fail to evoke the interest of the management to support Q_TEPS activities pertaining to that product. Hence this approach can be adopted only if the turnover of the products is uniform or the company produces only one product.

Turnover basis

Contrary to the individual price of the products, the sales turnover of the products is considered under this approach to financially convert the Q_TEPS activities. Here the

management will be tempted to support the Q_TEPS, which aims at improving the quality of the products that enjoy high turnover. At the same time, it discourages the management from supporting the Q_TEPS related tasks that are conducted to enhance the quality of the product with a lesser turnover. There is every chance that the Q_TEPS output may be useful in reviving or increasing the turnover of those products. Hence the suitability of this approach is restricted to the companies in which the turnover of the products is uniformly distributed.

Average sales price concept

In order to overcome the disadvantages of individual sales price concept, the method of considering average sales price per product was analysed. Under this method, the average sales price per product of the company should be considered for the financial conversion of Q_TEPS activities. Though this approach overcomes certain disadvantages of individual sales price concept, it suffers from one disadvantage (i.e.) Q_TEPS would be promoted to solve problem that has the least financial potential which would give an impression that Q_TEPS are financially ineffective. Hence the adoption of this method requires a prior cautious analysis.

Average salary concept

In this approach, the average salaries of all the categories of employees who are entitled to receive training through Q_TEPS are considered. This approach is general and free from encouraging any bias by the management to promote Q_TEPS in any particular area covering any particular product or brand. At the same time, this approach provides the option of approving Q_TEPS to attain the business goals of the company.

As the positive features of the average salary concepts far outweighs the features of other concepts, it was finally decided to adopt average salary concept in this module of the research work. Moreover, the researchers on training have indicated the close relationship between training and wages (Horn and Fichtner, 2003). Also, Barcala *et al.* (1999) have cited the economic theory which establishes the link between the training and the salary of the employee. These observations in literature favour the adoption of the average salary concept while developing financial conversion models of Q_TEPS. Further, as envisaged by Mulder (2001), the performance of Q_TEPS can be measured under appropriate characteristics using suitable scales and multiplying with an authentic factor. Since no such multiplication factor has so far been developed in training field, the financial conversion models used in Devadasan *et al.* (1999) for measuring the performance of quality circles were referred to. This framework was used to develop financial conversion models of the Q_TEPS activities. However, the suitability of the multiplication factor pertaining to a company has to be confirmed by conducting simple hypothesis testing with the help of a questionnaire-based feedback approach. The features of financial conversion models pertaining to a sample of four activities of Q_TEPS are illustrated in the following four subsections of this paper.

Management support

Management support is instrumental for the successful conduct of Q_TEPS (Motwani *et al.*, 1994). Management support can be assessed by assigning one point for every "yes" response against each of the following questions:

Is the management willing to:

- Depute adequate number of employees towards Q_TEPS?
- Provide suitable hours for meeting and analysis of Q_TEPS?
- Empower the participants of Q_TEPS to take action based on Q_TEPS recommendations?
- Participate in Q_TEPS presentations?
- Award suitably the achievements made through Q_TEPS?

Management support is pronounced in money values by allocating one percentage of the highest managerial employee's salary against each point. A company enjoying management support shall be said to create the asset at the cost of investing capital in intangible form.

Union support

Union support is assigned 50 per cent value of the management's support, if the support is offered on a conditional basis and 100 per cent value of the management's support, if offered unconditionally. Union support is also assigned 100 per cent value of the management's support, if unions do not exist or if the employees concerned are not under the control of the unions.

Skills development account

The successful completion of the Q_TEPS will lead to enhanced skill development (Huang, 2001) which can be considered to be a major gain. The skills development will be reflected in the following ways (Ng and Siu, 2004; Winch and McDonald, 1999; Jinabhai, 2005):

- reduced rejection and rework rate;
- increased production rate; and
- higher level of confidence in handling the work.

The methodology suggested for financial conversion of skills development is presented in Table VI.

Illustration

Consider the dairy in which the average monthly salary of an employee is Indian Rupees (INR) 8,000. According to the company executives, the employees can earn an average of three points after Q_TEPS. Assuming that 109 employees are employed, the financial value added will be $3 \times 0.02 \times 8{,}000 \times 109 = \text{INR } 52{,}320$.

Serial number	Reaction	Point
1	Reduced rejection rate and rework rate	3
2	Increased production rate	3
3	Higher level of confidence over handling the work	2

Note: Each point is assigned 2 per cent of average monthly salary per employee per month

Table VI.
Financial conversion of skills development

Motivation account

The successful conduct of the Q_TEPS will lead to increased levels of motivation (Patel, 1994; Galagan, 1993) which a gain, can be considered to be a major advantage (Barcala *et al.*, 1999). The motivation will be reflected among the employees in the following ways:

- *Punctuality.* A motivated employee of Q_TEPS will feel more attached to the company and his/her work, and will be forced to be punctual.
- *Increased work efficiency.* The employee lacking motivation will have a tendency to begin his/her work by taking some lead-time. If an employee is motivated through the participation in Q_TEPS, he/she will make a conscious effort to start the work immediately, even the early working hours.
- *Overall care for the workplace atmosphere.* It is expected that an employee motivated by Q_TEPS will be more attached to his/her workplace, which would find expression in the form of neatness and orderly arrangement of work piece and tools, etc.
- *Pleasant reaction to the work assignment.* An employee lacking motivation will resist doing the assigned work which may be expressed through either direct or indirect reactions. On the other hand, an employee motivated because of his participation in Q_TEPS will react pleasantly to the work assigned (Goetsch and Davis, 1997).
- *Careful handling of tools and other devices.* An employee who is not motivated properly will be tempted to handle tools and other devices carelessly, which would result either in failure or gradual wear and tear. In acute situations, it may even lead to accidents. Contrary to this, an employee motivated by the Q_TEPS would develop a sense of possessiveness towards the tools and devices supplied by the management and hence carefully handle the tools and devices.

As motivation is reflected in various forms, direct allocation of per cent values from the average monthly salary of an employee is not feasible. Hence, a method of allocating points for each type of reaction is proposed (Mulder, 2001). In some cases, wherein the reaction would be highly explicit, points can be allotted on a quantitative basis. But, in many other cases, the reaction cannot be quantified easily and its measure depends upon subjective judgments. The responsibility of subjective assessment is assigned to the team consisting of about five personnel who occupy higher ranks than that of the employee who has undergone Q_TEPS. This assessment is done purely on the basis of the nature of reactions. The allocation of points for accounting motivation financially is presented in Table VII. The average of all points allotted by the above personnel are considered for subsequent financial conversion.

Illustration

Consider the dairy in which the average monthly salary of an employee is INR 8,000. About 109 employees were observed for a week after four weeks of their participation in Q_TEPS. According to the reporting personnel, the employees earn an average of seven points under motivation. In this case the financial value for motivation of the employees is INR 61,040. (That is, $7 \times 0.01 \times$ INR $8{,}000 \times 109 =$ INR 61,040).

Serial number	Reaction	Nature of reaction	Points	Responsibilities
1	Punctuality	No late arrival	2	Time cards immediate reporting officer
		Late arrival in one day of week	1	
2	Starting the work right from the beginning of working hours	Good	1	Immediate reporting officer
		Not good	0	
3	Overall care for the work place	Good care	1	Immediate reporting officer (based on subjective judgment)
		Not taking good care	0	
4	Pleasant reaction to the work assignment	Good	2	Immediate reporting officer
		Moderate	1	
		Not good	0	
5	Careful handling of tools/devices	Good	2	Immediate reporting officer
		Moderate	1	
		Not good	0	

Notes: Maximum points allocated: 10 points; value of each point: 0.1 per cent of average salary of employee

Table VII.
Financial conversion of motivation

Account heads of Q_TEPS

Since it is prudent to account Q_TEPS using the traditional accounting procedures, it is required to identify the account heads of Q_TEPS. The account heads of Q_TEPS identified by overviewing the literature on general training (Phillips, 2004; Vermeulen and Crous, 2000; Motwani *et al.*, 1994) and Q_TEPS (Goetsch and Davis, 1997) are shown in Table VIII. As in the case of traditional financial accounting systems, double entry method of book-keeping (Porter and Norton, 1999) is adopted for financial accounting of Q_TEPS. According to this method, against every financial transaction, two entries are to be made in two different accounts. The rules governing these entries are known as journal entries. After the completion of posting the details in accounts, the trial balancing is drawn at the end of the financial year. Once the debit and credit balances in trial balance indicate the same values, the income and expenditure account and balance sheet of Q_TEPS of the financial year will be prepared. The income and expenditure account and balance sheet of Q_TEPS should enable the management to interpret their performance in terms of financial values.

Computation

The computation of Q_TEPS expenses in the company was a challenging task. This was because until then, the management and employees had not viewed any training and educational programmes from the financial evaluation point of view. Hence, the details were estimated by projecting the expected expenses and gains of the designed Q_TEPS. The sample computation for estimating the Q_TEPS activities pertaining to

Account heads
Work culture a/c
Communication a/c
Decision making ability a/c
Enthusiasm a/c
Motivation a/c
Positive attitude a/c
Work performance a/c
Creativity a/c
Team spirit a/c
Awareness a/c
Knowledge development a/c
Skill development a/c
Quality of work life a/c
Initiative a/c
Handling loss reduction a/c
Purchase return a/c
Production increase a/c
Spoilage reduction a/c
Energy savings a/c
Sales improvement and customer increase a/c
Working hour enhancement a/c
Increase in output due to new technology a/c
Cash book intangible a/c
Cash book tangible a/c
Employee a/c
Training expense tangible a/c
Machinery expense and installation a/c
Training expense intangible a/c
Management support a/c
Union support a/c

Table VIII.
Account heads of Q_TEPS

the Q_TEP titled "Quality planning for process control for handling loss minimization" (detailed design is shown in Table III) is illustrated here.

Tangible expenses:

Number of workers to participate = 26

Number of supervisors to participate = 4

Total number of participants = 26 + 4 = 30

Duration of the Q_TEP = One day

The computation of tangible and intangible expenses incurred is presented below:

Writing materials: work-books, paper, pencil/pen = INR 25 per participant

Refreshments = INR 80 per participant

Trainers' salary and perks = INR 3,000 per day

Tangible expenses of the Q_TEP = (25 + 80) × 30 + 3,000 = INR 6,150

Average daily salary of a worker = INR 267

Average daily salary of a supervisor = INR 333

Intangible expenses of the Q_TEP = (267 × 26) + (333 × 4) = INR 8,274

The projected tangible and intangible expenses for other Q_TEPS are shown in Table IX.

As shown, the 18 Q_TEPS topics will be covered by conducting 31 programmes.

Tangible gains

As indicated in Table III, the programme would result in the reduction of handling loss from 0.5 to 0.3 per cent. Then the tangible gain would be 0.2 per cent of the quantity produced. The computation followed to depict this tangible gain in INR is presented below:

Daily production volume of milk products = 1,30,000 litres

Daily savings = 0.2/100 × 1,30,000 = 260 litres of milk products

Average price of a litre of milk products = INR 13

Daily savings in INR = 260 × 13 = 3,380

Annual savings in INR = 3,380 × 365 = 12,33,700

Similar approaches were followed to compute other tangible gains, whose values in INR are shown in Table X. As shown, the Q_TEPS in the company is expected to result in a financial gain of INR 66,74,591. The intangible gains were computed using the financial conversion models. The financial values of intangible gains are shown in Table XI.

Appropriate journal entry rules were followed to post the computed values in different accounts. As a sample, the journal entry rules pertaining to the accounting of work culture and the corresponding entries in account heads namely "work culture account" and "employee account" are shown in Tables XII-XIV. After posting the details in accounts, the trial balance was drawn to check whether the debit and credit balances tallied with each other. The trial balance thus drawn is shown in Table XV.

Subsequently, the income and expenditure account and balance sheet pertaining to the conduct of Q_TEPS at the company for an year were developed. These statements are shown in Tables XVI and XVII.

Inferences from financial accounting statements

The income and expenditure account and balance sheet will enable decision makers to make some important interpretations. Some of the inferences drawn from Tables XVI and XVII are mentioned below:

- it is expected that the implementation of Q_TEPS in the company would result in a value addition of INR 28,82,739 annually, which includes both tangible and intangible values;
- it is expected that the tangible training expenditure to be incurred for implementing Q_TEPS at the company will be INR 2,01,570 and the intangible training expenditure will be INR 3,15,684;
- it is expected that the implementation of Q_TEPS at the company will result in maximum income of INR 12,33,700, through reduction of handling loss; and
- it is expected that the implementation of Q_TEPS at the company will result in a minimum income of INR 13,952 through awareness.

Q_TEP number	Direct tangible expenses in INR	Indirect tangible expenses in INR
1	6,150	8,274
2	6,150	8,208
3	5,205	6,601
4	4,050	3,335
5	7,935	13,611
6	7,725	12,944
7	7,725	12,944
8	5,730	9,931
9	7,410	11,678
10	7,410	11,744
11	7,410	11,744
12	5,520	7,203
13	7,095	11,874
14	7,095	11,207
15	4,680	4,405
16	5,415	8,396
17	7,935	13,611
18	7,725	12,944
19	7,725	12,611
20	6,885	9,879
21	6,780	9,612
22	6,780	9,612
23	4,890	7,669
24	6,885	14,011
25	6,780	13,344
26	6,780	13,344
27	5,940	7,875
28	6,465	10,804
29	6,465	10,137
30	5,205	8,266
31	5,625	7,866
Total expenses	201,570	315,684

Table IX.
Tangible and intangible expenses

Serial number	Expected gain	Percentage savings/improvements	Savings in INR per year
1	Handling loss reduction	0.2	1,233,700
2	Purchase return	0.1	616,850
3	Increase in production	5.0	958,125
4	Spoilage reduction	0.05	73,000
5	Energy conservation	5.0	982,690
6	Sales improvement	2.0	94,900
7	Purchase return	0.1	616,850
8	Customer increase	2.0	94,900
9	Working hour enhancement	6.0	1,197,656
10	New technology	1.5	711,020
11	Increase in sales	2.0	94,900
	Total tangible gain per year in INR		6,674,591

Table X.
Tangible gain

Serial number	Intangible gain	Expected intangible gains in INR
1	Work culture account	52,320
2	Communication account	26,160
3	Decision making ability account	52,320
4	Enthusiasm account	34,880
5	Motivation account	61,040
6	Positive attitude account	32,700
7	Work performance account	34,880
8	Creativity account	17,440
9	Team spirit account	87,200
10	Awareness account	13,952
11	Knowledge development account	87,200
12	Skills development account	52,320
13	Quality of work life account	87,200
14	Initiative account	17,440
Total intangible gain per year in INR		657,052

Table XI.
Intangible gains in INR

		INR	INR
30-04-05	Employee A/c. . . . . .Dr.	52,320	
	To work culture A/c. . . . . .Cr.		52,320

Table XII.
Journal entries for work culture account

Dr. Date	Particulars	Amount (INR)	Date	Particulars	Cr. Amount (INR)
30-04-05	To balance c/d	52,320	30-04-05	By employee A/c	52,320
		52,320			52,320
			30-04-05	By balance B/d	52,320

Table XIII.
Work culture account

Conclusion

Right from the days of TQM era, the need of training and educational programmes have been emphasized. Researchers working in this direction have evolved different frameworks for the same. This points at the difficulty in formulating a common Q_TEPS framework. At this juncture, it is worthwhile to note that many researchers have claimed that the training and educational programmes would result not only in profits but also in other human related gains like multi-skill development and generation of enthusiasm towards the work among the employees (Hamazah and Zairi, 1996). Besides, researchers have observed "training and education" as the one of the critical success factors of models used in the recently emerging areas like knowledge management and environmental management (Hung *et al.*, 2005; Wong, 2005; Wee and Quazi, 2005). Likewise, the Six-Sigma programme which is fast spreading across the globe, is encapsulated with well designed training programmes (Raisinghani *et al.*, 2005). It was in this context that, the research project reported in this paper was carried

Dr. Date	Particulars	Amount (INR)	Date	Particulars	Cr. Amount (INR)
30-04-05	Work culture A/c	52,320	30-04-05	By balance B/d	657,052
	Communication A/c	26,160			
	Decision making ability A/c	52,320			
	Enthusiasm A/c	34,880			
	Motivation A/c	61,040			
	Positive attitude A/c	32,700			
	Work performance A/c	34,880			
	Creativity A/c	17,440			
	Team spirit A/c	87,200			
	Awareness A/c	13,952			
	Knowledge development A/c	87,200			
	Skills development A/c	52,320			
	Quality of work life A/c	87,200			
	Initiative A/c	17,440			
	To balance c/d	657,052			

Table XIV.
Employee account

Account heads	Debit balance	Credit balance
Work culture a/c		52,320
Communication a/c		26,160
Decision making ability a/c		52,320
Enthusiasm a/c		34,880
Motivation a/c		61,040
Positive attitude a/c		32,700
Work performance a/c		34,880
Creativity a/c		17,440
Team spirit a/c		87,200
Awareness a/c		13,952
Knowledge development a/c		87,200
Skill development a/c		52,320
Quality of work life a/c		87,200
Initiative a/c		17,440
Handling loss reduction a/c		1,233,700
Purchase return a/c		616,850
Production increase a/c		958,125
Spoilage reduction a/c		73,000
Energy savings a/c		982,690
Sales improvement and customer increase a/c		94,900
Working hour enhancement a/c		1,197,656
Increase in output due to new technology a/c		711,020
Cash book intangible a/c		333,124
Cash book tangible a/c	2,541,371	
Employee a/c	657,052	
Training expense tangible a/c	201,570	
Machinery expense and installation a/c	3,125,000	
Training expense intangible a/c	315,684	
Management support a/c	8,720	
Union support a/c	8,720	
	6,858,117	6,858,117

Table XV.
Trail balance of the output from Q_TEPS

Account	Expenditure	Income
Work culture a/c		52,320
Communication a/c		26,160
Decision making ability a/c		52,320
Enthusiasm a/c		34,880
Motivation a/c		61,040
Positive attitude a/c		32,700
Work performance a/c		34,880
Creativity a/c		17,440
Team spirit a/c		87,200
Awareness a/c		13,952
Knowledge development a/c		87,200
Skill development a/c		52,320
Quality of work life a/c		87,200
Initiative a/c		17,440
Handling loss reduction a/c		1,233,700
Purchase return a/c		616,850
Productivity increase a/c		958,125
Spoilage reduction a/c		73,000
Energy savings a/c		982,690
Sales improvement and customer increase a/c		94,900
Working hour enhancement a/c		1,197,656
Increase in output due to new technology a/c		711,020
Training expense tangible a/c	201,570	
Machinery expense and installation a/c	3,125,000	
Training expense intangible a/c	315,684	
Value addition	2,882,739	
	6,524,993	6,524,993

Table XVI.
Income and expenditure account of Q_TEPS

Particulars	Assets (INR)	Liabilities (INR)
Value addition		2,882,739
Cash book intangible a/c		333,124
Cash book tangible a/c	2,541,371	
Employee a/c	657,052	
Management support a/c	8,720	
Union support a/c	8,720	
	3,215,863	3,215,863

Table XVII.
Balance sheet of Q_TEPS

out in a company manufacturing milk products. Two contributions were the major hallmarks of this research project. The first contribution was the detailed design of Q_TEPS for the company, which can be used as a reference model by TQM professionals. The second was the design of a financial accounting system of Q_TEPS accompanied by financial conversion models. This will enable the TQM professionals to convert the result of Q_TEPS in financial values and to project their performance through the language of money. It appears that no research on implementing Q_TEPS in milk products manufacturing scenario has been reported so far. Hence, the above contributions of this research project can be said to be unique in the field of TQM.

The general requirements of Q_TEPS were coupled with the continuous quality improvement of milk products manufacturing. The tangible and intangible values indicated in the financial accounting statements create an impression that the Q_TEPS implementation in the company would lead to considerable increase in value addition.

This company is a government run organisation, and hence it was not immediately possible to even test implement the Q_TEPS designed during this research project. Hence, we decided to carryout a hypothesis testing as done by Peng *et al.* (2005). For this purpose, it was decided to collect the feedback using questionnaires from the competent personnel. These personnel were offering their expertise and sharing ideas, data and information during the design of Q_TEPS and their financial accounting system in the company. The summary of the responses received against the questions on Q_TEPS are indicated in Table XVIII. As can be seen, the first question aimed at testing the level of understanding of Q_TEPS. As the values were found to be 8.8 in a scale of range 0-10, the reliability of the results assessed was considered to be reasonable. The second question tested the first hypothesis (*H1*) that the proposed Q_TEPS would be useful in improving quality. As the average value was found to be 8.4 in the scale of 0-10, the *H1* was accepted. The third question aimed at checking the second hypothesis (*H2*), that the investment on Q_TEPS would justify the gain. As the value was 8 in a scale of range 0-10, the *H2* was accepted. Further, the respondents were asked to write down their opinions. The opinions written by them are shown in Table XIX. Similar exercise was carried out to establish the validity of financial accounting system of Q_TEPS. The corresponding summary of responses is shown in Table XX. As indicated, the first question tested the *H1* that the values depicted in financial accounting statements of Q_TEPS were reasonable. As the average value was found to be 8.25 in the scale of range 0-10, the *H1* was accepted. The second question aimed at checking the *H2*, that the inferences drawn from the financial accounting statements of Q_TEPS were realistic. As the average value was found to be 8 in the scale of range 0-10, the *H2* was accepted. Further, the respondents were asked to write their overall opinion about the financial accounting system of Q_TEPS. Their responses are presented in Table XXI. As indicated, the financial values of Q_TEPS activities that have been developed using this system were found reasonable by the responders. Thus the validity of Q_TEPS and its financial accounting system at the company was established. Finally it is concluded that the overall response obtained from the company executives is very positive and the proposed Q_TEPS and its financial accounting system can be implemented successfully.

Question number	Questions	Average value in a scale of 0-10
Number of respondents: 5		
1	To what extent you have understood the essential features of the proposed Q_TEPS?	8.8
2	To what extent do you believe that the proposed Q_TEPS will help in improving quality?	8.4
3	To what extent do you think that the investment on Q_TEPS will justify the gain?	8

Note: 0-indicates not at all; 5-partially; 10-fully

Table XVIII.
Summary of feedback on Q_TEPS

Respondent number	Opinion
1	The study was conducted very effectively and the proposals given are very useful to improve the quality of products and services rendered by the milk products manufacturing unit. Also the proposals will help to reduce the unit cost of its products, if implemented effectively
2	Effectively possible to implement it in a phased manner. Co-operation and awareness among the employees is very much essential in order to achieve the goal. Training programme will help them for it. The viability of the unit will be improved which ultimately helps farmers
3	Very good. The employees will get adequate knowledge in Q_TEPS, which will improve production and give good savings
4	The proposal seems to be genuine and essential as far as we are concerned
5	By implementing the proposed Q_TEPS, the quality of the product can be improved and substantial savings can be obtained. The work seems to be quite good

Table XIX.
Respondents' general opinion on Q_TEPS

Question number	Questions	Average value in a scale of 0-10
Number of respondents: 4		
1	To what extent, do you believe that the financial values depicted in financial accounting statements of Q_TEPS are reasonable	8.25
2	To what extent do you believe that the inferences drawn from the financial accounting statements of Q_TEPS are realistic	8

Note: 0-indicates not at all; 5-partially; 10-fully

Table XX.
Summary of feedback on the financial accounting system of Q_TEPS

Respondent number	Opinion
1	I believe that the financial accounting statements are very near to the actual if implemented carefully and systematically with the co-operation of workers
2	The proposed financial accounting system of Q_TEPS seems to be reasonable and the financial values mentioned in the report could be achieved if it is implemented effectively with the cooperation of all the employee in the unit
3	In the case of financial accounting statements of Q_TEPS 100 per cent achievements is possible in tangible account, where as under normal conditions more than 70 per cent achievement is possible in intangible account. Intangible account achievement can be increased due to training and encouragement
4	The financial accounting system of Q_TEPS mentioned in the report is found to be realistic. Anyway, the result of the training will be based on the co-operation and attitude of the employees who are being trained. The financial values depicted are found to be reasonable

Table XXI.
Respondents' general opinion on the financial accounting system of Q_TEPS

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