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Knowledge Transfers on Blue Collars: Case of Good Manufacturing Practices for Personal Hygiene in Mexico

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Abstract

There are different ways to train personnel in a manufacturing plant, ranging from in-person to virtual training. However, there is currently no standard model or methodology to measure the effectiveness of this training on the position, work cell, and indicators. This work proposes a method to measure the impact of training strategies through an indicator called a "Real Training Indicator." This method is based on requirement 7.2 of the ISO 9001:2015 Standard, which refers to the "Competence of Personnel." The Kirkpatrick, Wade, and Phillips models are used to measure the impact of training in a transnational organization in Mexico. This method estimates the level of transfer and effectiveness of the training to cover the requirement of Good Manufacturing Practices.

Keywords: Good Manufacturing Practices; Knowledge Transfer; Personal Hygiene; Real Training Indicator; Food Industry; Blue Collars; Mexico

Introduction

Brief History of Standardization

The standardization of processes and activities has indeed been an idea that has evolved over the years and has had a significant impact in various fields. The International Federation of National Standardizing Associations (ISA) or ISA, which was founded in 1926, was an important step in this standardization process. However, it is important to note that the organization that has really played a central role in standardization at the international level is the International Organization for Standardization (ISO).

The ISO, as mentioned in the quote, was founded in 1946 and has played a key role in the development and promulgation of technical and quality standards around the world. Its creation was influenced by the need to control and improve production processes during and after World War II. ISO standards are applied in a wide variety of industries and sectors, and contribute to interoperability, quality, safety and efficiency in many areas.

Over the years, ISO has developed thousands of technical standards covering everything from quality management to food safety, environmental management and many other areas. These standards help organizations and countries standardize processes, products, and services, which in turn facilitates international trade and technical cooperation.

In summary, the standardization of processes and activities has evolved, and the ISO is one of the most prominent organizations in this field, having been established after World War II to address quality control and production needs in that period.

Good Manufacturing Practices, GMP

Currently, in our country, health authorities consider it a priority to establish food safety policies, through the application of systems that minimize the risks of contamination, to reduce the number of food-borne diseases (ETA's). One of these forms is the application of quality assurance systems, within which the implementation of Good Manufacturing Practices (GMP) and Health Standard Operating Procedures (POES) are considered, in the production of food.

The hygienic-sanitary or sanitary quality of food refers to the composition, purity, and reliability of a product, which complies with governmental and international health standards that guarantee satisfaction of the consumer's expectations and needs, the above refers to to food safety; that is, the absence of physical, chemical and microbiological contaminants, toxins and any other substance in the food that may be harmful to health, in such a way as to ensure that the food will not cause harm to the consumer when it is prepared and/ or consumed under the use that should be given to it.

Foodborne Diseases

According to the World Health Organization, Foodborne Diseases are a "Set of symptoms caused by the ingestion of water and/or food that contain biological agents (viruses, bacteria, fungi, parasites) or non-biological agents (physical) in quantities such that they affect the health of the consumer."

Among these we can differentiate food infections, which are produced by the ingestion of foods contaminated with infectious agents such as bacteria that can multiply in the intestine and produce toxins, the other hand, food poisoning is produced by the ingestion of toxins (metabolic products). of microorganisms).

The GMPs cover elements and activities of hygiene, sanitation, adequate cleaning and disinfection methods, and the correct handling of food, as well as the raw materials and additives with which they are made (Health Office, 2009). These are mandatory nationally and abroad, their application also allows important advantages for plants dedicated to food production, such as:

- Standardize quality.
- Reduce risks to consumer health.
- Compete with other markets.
- Maintain the image of the products and increase profits.
- Guarantee a physical structure by health requirements.
- Avoid sanctions from health authorities.

The importance of the sanitary quality of food lies in the contribution to the prevention and reduction of risks to public health, due to poisoning and infections transmitted by the consumption of contaminated food.

Concept and functions of training evaluation in organizations

We can define training evaluation as "the analysis of the total value of a training system, program or course in both social and financial terms. The evaluation attempts to assess the total cost-benefit of the training and not only the parrot of its immediate objectives" (Kenney-Donelly, 1972 p.69). The evaluation focuses on determining the degree to which the training has responded to the needs of the organization and its translation in terms of economic and qualitative impact, so it performs three basic functions:

Pedagogical Function, which verifies the process of achieving the objectives to improve the training itself.

Social Function, which certifies the acquisition of learning by the participants.

Economic Function, which identifies the benefits and profitability that training generates in the organization.

These three functions are aimed at achieving the ultimate purpose of the evaluation: the provision of information that guides decision-making and leads to the introduction of improvements in training and must always be aimed at improving the training process, and not at control. of the people involved in it.

Training Evaluation Modalities

The evaluation, to be truly effective, must be integrated into the planning process, and must occur throughout it through its different modalities, which have a mutual interdependence:

Diagnostic Evaluation, focused on the analysis of the pedagogical coherence of the designed training and its adaptation to the training needs detected in the organization and in the participants.

Formative Evaluation analyzes the progress of the teaching-learning process and the progress in achieving the stated objectives.

Summative Evaluation, focused on the final results obtained by the participants in terms of competencies achieved at the end of the training.

Transfer Assessment determines the degree to which participants transfer or apply the learning and competencies achieved with the training to their jobs.

Impact Assessment determines the repercussions that training has on the organization in terms of qualitative and quantitative or monetary benefits, thus aiming to discover the economic profitability of training for the organization.

Holistic Training Evaluation Model

The model consists of answering the five basic questions that affect the evaluation in an integrated way, crossing the answers and developing a set of evaluation strategies that cover the entire training process:

For whom do I evaluate? The answer determines the purpose of the process and its orientation.

What did you evaluate? Elements and aspects to evaluate, at six basic levels:

Level 1: Participant satisfaction with the training.

Level 2: Achievement of learning objectives by participants.

Level 3: Pedagogical coherence of the training process.

Level 4: Transfer of learning to the workplace.

Level 5: Impact of training on the organization's objectives.

Level 6: Profitability of training for the organization.

Who evaluates? The agents who make judgments about the training should be those affected by it.

When I evaluate? There are four basic moments:

Before starting training.

During training.

At the end of the training.

Sometime after finishing the training.

How do I evaluate? The instruments are varied, for example: surveys, questionnaires, interviews, etc.

The Holistic Evaluation Model arises from the crossing of the answers to these five basic questions and their integration into a global whole, thus allowing the design of an effective evaluation plan, which translates into effective and efficient evaluation processes based on available resources, measuring their impact on the organization.

Training Impact Assessment

Training impact is understood as the repercussions that carrying out training actions has for the organization, in terms of response to training needs; It consists of the changes that the completion of learning thanks to training and its transfer to the job generates in the department or area of the trained person and in the entire organization. The effects are of two types:

Impact Assessment Models

The evaluation of the impact and profitability of training is located at the last levels of existing evaluation models. Thus, the Holistic Evaluation Model presented occupies the fifth and sixth levels. There are other models that focus specifically on evaluating the impact and profitability of training, such as the Kirkpatrick, Phillips and Wade Models.

Kirkpatrick model

Kirkpatrick established the foundations of continuing education evaluation in the 1960s. The four levels of the model are:

Reaction of participants to the training.

New skills acquired thanks to training.

Conduct of participants in the workplace.

Results in the organization (the impact).

The author suggests guidelines that can facilitate the process:

Rigorously select the moment of evaluation.

Use a control group (essential).

Consider the cost-benefit ratio of the evaluation.

Accept the evidence in the face of the impossibility of proof (when it is not viable).

Kirkpatrick takes a qualitative approach to training impact. It is a mistake to make profitability the ultimate goal of any evaluation process, since it would lead to a reductionist vision of the impact of training.

Qualitative, or not translatable into economic terms.

Quantitative, or translatable to monetary values. The economic impact allows us to obtain a profitability index, expressed in monetary terms, generated by the investment made in training.

The evaluation of impact and profitability responds to one of the three functions of evaluation: the economic function, which is why

impact evaluation is also called “Evaluation of Organizational Results”.

Phillips model

It is based on Kirkpatrick’s guidelines, but adopts a more quantitative approach, and focuses on developing a methodology that allows evaluating the economic impact of training, taking the return on investment (ROI) as a calculation tool. The phases of your model:

Data Collect.

Isolation of training effects.

Classification of economic and non-economic benefits.

Conversion to monetary values.

Calculation of Return on Investment (ROI).

The vision is reductionist since it focuses on economic results and forgets the results of training.

Wade model

Wade conceives evaluation as measuring the value that training brings to the organization. Structured in four stages:

Response: reaction to training and learning by participants.

Action: transfer of learning to the workplace.

Results: effects of training on the business (quantitative or hard or qualitative or soft indicators).

Impact of training on the organization, through cost-benefit analysis.

The model is like Kirkpatrick’s, but with important differences in the levels referring to the impact (evaluation of the impact and profitability of the training). It identifies two progressive levels in this type of evaluation: evaluation of the results of training in the workplace (hard or soft indicators) and evaluation of the impact that the train-ing generates in the organization, for which it proposes a cost-benefit analysis. as a measuring instrument.

Methodology

Real Training Indicator

The sampling plan

A sample size of 289 employees with operating positions in a factory dedicated to the production of powdered beverages located in the State of Mexico was defined. The study group was given the Good Manufacturing Practices Course in 16 groups of 18 people before conducting the study. An internal audit scheme was followed in the 11 lines of the facility, constituted by a group of 6 auditors belonging to the Quality Control department.

The audit

The audit consisted of identifying, through observation, those behaviors that are part of the Good Manufacturing Practices and how the operating personnel performs or fails to perform them (for example, using long fingernails, not using a mask, using rings, etc.) during 3 weeks, establishing a relationship between the qualification in the classroom and the non-compliances, considering this a transfer basis between training, understanding, purpose, and application of the knowledge acquired and regulated through a regulation.

Once the evaluation has been carried out, it should be reviewed with the areas of Manufacturing, Quality, Food Safety, and Human Resources to define opportunities, as well as to establish plans for correction, prevention, and improvement of the teaching-learning process.

Evaluation and calculation

Description of the Psycho-Social Mathematical Model:

The model is formulated as follows:

RTI= Classroom qualification – HRI

Where,

RTI= Real training indicator (psycho-social part) that measures how the trained person transfers the knowledge acquired in the classroom to their workplace.

HRI= [(# events of non-compliance with BPM's) / defined days of working hours] referring to the performance you present in your job, aware of your new skill or new knowledge (psychological part).

Results

The audit is carried out in 3 plants in three cycles, randomly and on different days, as seen in table 1, an extract of the information collected in the evaluation cycles carried out is shown.

Employee	*Test evaluation*	*RTI*
Employee 1	10	8
Employee 2	7	3
Employee 3	7	7
Employee 4	7	7
Employee 5	7	5
Employee 6	10	8
Employee 7	10	8
Employee 9	8	6
Employee 10	7	5

Table 1: GMP evaluations.

Audits were carried out from May to August, observing the behaviors of the collaborators, identifying faults in personal hygiene practices, impacting them on the result of their exam and establishing the difference between the qualification obtained in the training and the execution in the workplace (see Chart 1).

The strength of the relationship between the training rating and the behavior observed in the workplace was analyzed to compare the transfer of the event (Graph 2).

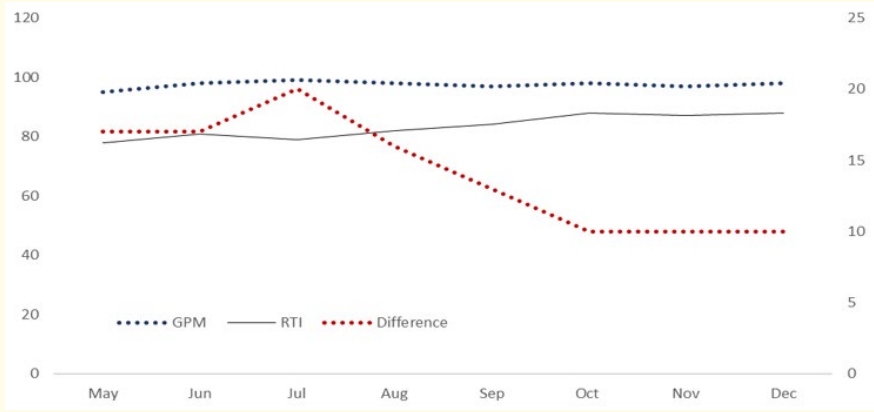

Chart 1: Trend of evaluations for training in personal hygiene practices, those obtained in the job review, as well as the difference between the two.

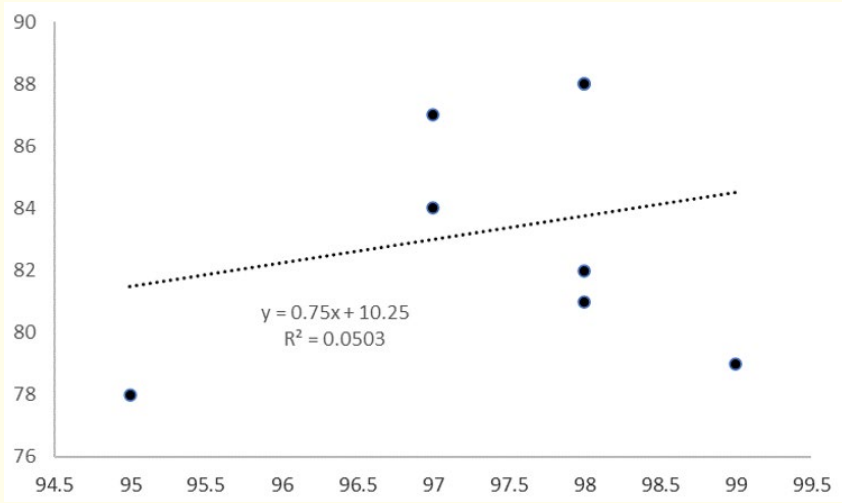

Chart 2: Strength of relationship between the evaluation of training and the behavior observed in the groups studied.

Conclusions

The food industry presents great challenges within the supply chain, and within this context we find safety and as part of its requirements, we have good manufacturing practices, stopping specifically at personnel hygiene practices, to understand how the transfer occurs from the moment the blue-collar leaves training until the execution in the workplace. The audits were a fundamental key to identifying the behaviors that employees perform in their position during the day, contrasting with the evaluation of their written test.

The results of the Human Rate Factor (HRF) show that of the people sampled, 27% committed at least one violation of the GMPs, while only 6% committed two violations and no collaborator committed more than 3 violations, of which The most common was “long nails” with 38.5%, “bad phase mask” with 20.5% and “makeup” with 12.5%, mainly.

The most frequently presented grades were “7” with 42.4% and “10” with 32.3%, however, the RIT evaluator observed that the highest grade continued to be “7” with 31% and “10” passed. from 32.3% to 17%, almost half of the people who had obtained this qualification in the training.

During the follow-up from April to December, the monthly average of these evaluations during training was 9.75, while the RTI was 8.33 with a difference of 1.41 points. It was also observed that behavior improved by feeling observed since from August to December the difference was reduced to only 1.18, which provided leadership and communication opportunities within the GMP program.

A study was carried out to understand the relationship between the result obtained in the exam and the behaviors observed in the workplace and the result of the linear regression was that the r-sqr was 0.05, while for the correlation study we calculated the Pearson, who tells us that training for personal hygiene practices does not have a strong impact on the behaviors of employees in their jobs.

These results lead us to several conclusions:

a) The people who execute the training have communication opportunities as well as training skills.
b) Development plans are not focused on identifying opportunities in soft skills.
c) The detection of needs focuses only on the audit requirement, and not on the needs of the system.
d) There is no well-communicated meaning and purpose of GMP compliance.
e) The audit scheme must be modified to integrate more questions of reflection and conversation than the search for good/no good.

It is recommended to continue with this study to understand how e-learning platforms are currently working and, under the concept of Operational Excellence, link the master training plans with the reduction, containment, and elimination of losses, with the objective that the training program tangibly supports Quality and Productivity programs.

Research limitations

The present work was carried out on 11 lines within the same complex, so these results represent only this level of research, and the field of study would have to be expanded to have information that includes a representative sample.

Future research

As part of further research, a scheme is being developed to design and evaluate the effectiveness of training within a Kaizen Event. This was mentioned by Van Aken, Van Aken, Farris, and Cross, Glove (2010).

The findings of the research focused on critical thinking when Good quality practices are carried out in the company, allowing the employees fundamental personal growth in their development, future research focuses on observing this critical thinking behavior in Kaizen events to validate if the conclusions in the seminal paper by Van Aken et al., (2010) can be observed for the behavior and thinking of employees when a Kaizen event is carried out. In addition, trying to find critical thinking as part of the theoretical framework of Kaizen and mindfulness developed by Suárez-Barraza and Huerta-Carvajal (2023).

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