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ERROR PROOFING: EFFECTIVE TOOL FOR OUTPUT EFFICIENCY

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Abstract:

A failed business operation due to a mistake or error is the last thing that Managers do not want to hear in business. Since workplace errors have serious direct ramifications on business and career of staff, management always wants smooth operations to achieve the desired objectives. This study therefore, works to design and develop a comprehensive Error Proofing Plan taking into account various critical factors that cause industrial errors. The Study researches that; if staff and workforce trained systematically along with machines properly programmed or installed, plus workers can exercise very careful moral due diligence in all their work processes and steps, mistakes are practically impossible to occur. However, or at the least they are easy to detect and correct. Research also speaks about how robust mistake proofing policies can be implemented and achieved for Organizational prosperity.

Index Terms: Error, Mistakes, Efficiency**,** Output & Proofing

1. Introduction:

Managers throughout the ages worried and are still worrying about nature of errors that perhaps generate in any day organizational work routine. It could be in Product manufacturing, manufacturing process or even in Services Offerings. The factual reason for this is that any workplace mistake can create loss of money and goodwill for the business and through management action leading to loss of job for the staff involved in the said known or unknown lapse. In today's critical scenario where Health, Social Responsibilities of Corporations, Safety and Environment matters are at the highest degree for a thriving business, any bacterial amount of error could be fatal for its existence in the Market. Therefore this research is aimed to provide solution as a prevention to avoid arisable workplace mistakes either by staff or machines. The man behind our inspiration to research extensively in this topic was Mr. Shigeo Shingo from Japan. Mr. Shingo was a Japanese Industrial Engineer considered to be world's leading expert in manufacturing practices who formulated Poka-Yoke meaning 'mistake-proofing'. A poka-yoke is a mechanism in a lean manufacturing process that helps an equipment operator avoid (yokeru) mistakes (poka). Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur. The concept was formalised, and the term adopted, by Shigeo Shingo as part of the Toyota Production System. Since then, managements from a lot of industries and various sectors have worked to better the concept and applied to their industries respectively involving products and services offerings. More broadly, the term can refer to any behaviour shaping constraint designed into a process to prevent incorrect operation by the user. A simple poka-yoke example is demonstrated by a Kaspersky anti-virus package when installed at a computer whereby the user due to package's inherent built-in features will have to manually click a “Scan Now” option prompt (a process step, therefore a poka yoke) when a external storage device is been connected to the computer. Similarly a spelling check option in a E-mail suite or Office package is yet another example of a poka-yoke application. Over time, the users or operators’ behavior is conformed to the requirements by repetitions and habit formation. So, with this idea and fundamentals, an attempt is being made in this research to construct a strong

proofing system which can be applied universally.

2. Research Objectives:

Primary objective of this paper is to format a steady mistake prevention plan for avoiding workplace errors. Developing the plan gradually into a implementable methodology as a part of Organization's operational strategy routine towards their output efficiency is also a pivotal aim of this paper. The study also aims to educate the reader about how staff and employees can exercise careful attention in detecting and avoiding all existing, new arisable and controllable workplace errors.

3. Research Methodology:

To carve out an effective robust Mistake Proofing system, information about variety of already committed, possible, repeated and unknown future arisable errors at workplace were discussed with randomly sampled Managers from different industry sectors using direct interview method. From the interview responses, underlying philosophy of mistakes explicitly recognizes that: People forget inadvertently and make errors with operational steps or tasks. Secondly, Machines and processes failing and new errors will keep arising due to numerous controllable and non-controllable reasons. Based on this phenomenon, proofing steps and proposed implementation methods were constructed using tabular propositions for deriving inferences and drawing meaningful conclusions to control workplace errors.

4. Analysis & Interpretations:

Based on the discussion with industry managers, mistakes can be for instance naturally proofed in 3 simple steps shown in table below which all workers should take cognizance of :-

Table 1. Mistake-Proofing in Three Simple Steps

1. **Identify possible errors that might still occur in spite of preventive actions.** At each step in the process simply ask the question "What possible human error or equipment malfunction could take place at this step?" E.g., an apparently symmetrically shaped part could inadvertently be installed backward. *This could be an area where a truly negative or paranoid person within the organization becomes an asset.*
2. **Determine a way to detect that an error or malfunction either is taking place, or is about to take place.** A guide pin might be added to prevent the incorrect part installation sited in #1 above. *Don't just rely on people to simply catch their own errors all the time.*
3. **Identify and select the specific action to be taken when an error is detected.** There are three basic actions. Listed in their order of preference, they are:
– **Control.** An action that self-corrects the process error, e.g., a spell-checker/corrector.
– **Shutdown.** A procedure that blocks or shuts down the process when an error occurs, e.g., a lockout switch.
– **Warning.** Alert the person involved that something is going wrong. E.g., a aircraft pilot's altitude voice warning PULL UP, PULL UP. *The primary weakness with warnings is the fact that they are frequently ignored, especially if they occur too frequently. Therefore, controls and shutdowns are generally preferred over simple warnings.*

Well expanding above steps, failure in escalating to managerial higher-ups when error is committed or detected is also a Human error. Reason for this being top management could always be a factor to reduce the impact of the error. Therefore one could proof this with *checklists* pinned in workstation or desk noticeboards directing the point of contact for error escalations when detected. Deploying *Supervisory manual verifications* is also better way to mistake proof final output. Between, let us examine few examples depicted in below Table 2 as well which employees can also follow.

Note:

Proofing Tools displayed for error prevention purposes in this research will always have a further scope to add new safety checks as well as deduct few basing upon

the nature of respective businesses and operational industry.

Table 2. Some Examples of Mistake-Proofing

Polka-Yoke Tool	Manual Implementation	Automated Implementation
Guide pins	Asymmetric pins prevent the worker from inserting parts upside down, and different sized pins prevent the use of incorrect parts.	Photodetectors sense the alignment of parts and stop the line if one is not in proper position.
Error detection and alarms	The worker uses a kit with the exact number of parts needed. A part left over after assembly alerts him to an error.	General Motors used a process in which the automated detection of a hidden nut was required for an assembly to continue down the production line.
Limit switches	A torque wrench prevents over-tightening of a nut.	Movement of a machine is sensed and stopped at preset limits.
Counters	A digital counter indicates the number of holes drilled in a plate. An incorrect reading at the end indicates an error.	A computer counts the number of welds on an auto body. The line does not move until the correct number is reached.
Checklists	Worker checks off tasks as they are performed.	Use of a software program to control a machine.

In addition to above check tables, Various Control Charts could also be used to detect probable deviations that may lead to errors. Standard Operating Procedures (SOP) should also be compulsorily developed to document error detection, reduction, eliminations and prevention techniques. Automation is also a great way to eliminate human intervention in business process and manufacturing assembly lines. Lean Six Sigma would also be a methodology that relies on a collaborative team effort to improve performance by systematically removing waste, error causing elements and thereby combining lean manufacturing/lean enterprise and Six Sigma to eliminate the eight kinds of waste: Time, Inventory, Motion, Waiting, Over production, Over processing, Defects, and Skills.

5. Findings:

Based on above analysis and interpretation of mistake proofing methodologies and examples, it can be gathered that full 100% mistakes cannot be stopped from occurring at workplace. The factors for this are supervisory cannot fully control a staff's psychological mind physically when he/she is performing a operating procedure of a specific task related to the job or delivery. Moreover, machines can go wrong or any bug could arise during manufacturing process which is again uncontrollable. But, what we can do is detect such errors and ensure preventing it from re-occurring again. Correction or Rectification of errors is also a important aspect of Business Accountancy. Likewise, Bank Reconciliation Statement Process as well as a automobile company recalling units of car due to faulty breaking system or engine is a also a great example for error detection and correction. It is also worth noting that Programs like Automation and Lean business process initiatives are taken up to the fact that management is very well aware of '1-10-100 Rule' when it comes to errors and mistakes. The 1-10-100 rule states that every time a product or service moves through the production system, the cost of correcting an detected error multiplies by 10 as you can see below in Table no.3:

Table 3: Depiction of '1-10-100' Rule

Activity	**Cost**
Order entered incorrectly	$1
Error detected in billing	$ 10
Error detected by customer	$ 100

Output Impact:- Dissatisfied customer shares the experience with others...	

6. Conclusions:

Therefore to conclude this study, in addition to various safety procedures and checks developed and discussed above, manual checks should always be effective medicine even if there are suitable technological checks. Continuous checklist updating and also updating it after any new mistake has been occurred reported and corrected with new remedies after what people have learned should also be a part of organizational best practice. Trainings on various Human Factors like staying focused, making due diligence, sound presence of mind should be facilitated by the managers. Although, there is no any guaranteed method to prevent human errors, avoiding stress and remaining focused by drinking coffee are the most often used and practical everyday method available to all. As defined in the beginning of this research, human errors are typically results of long chains of events and preventing human errors in workplaces requires different types of preventive actions. For example, skills and safety awareness at the individual level about the risk factors of human errors, safety awareness and leadership programs provided by organizations (like managers and supervisors recognizing the risk factors for human errors) and appropriate technical resources along with Automation (like safe design; solutions not requiring active human engagement such as handrails, light curtains etc.). All these tools are now being available in the markets (serviced) and competitively priced so that companies can afford their operational safety requirements in investment through cash provisioning.

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