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The Role of Human Error in Production Process Failures: A Systematic Literature Review

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ABSTRACT

Human error One of the most common causes of production failures is human mistake, which can impact product quality, operational efficiency, and workplace safety. This research aims to analyze the role of human error in the production process using various analytical methods found in the literature. This research uses a Systematic Literature Review (SLR) approach to explore the literature related to Human Error in the production process, with the aim of identifying, evaluating, and synthesizing the results of relevant studies. This research shows that 70-90% of quality defects are caused by human error, which impacts quality, increases operational costs, and poses a risk of workplace accidents. Research shows that factors such as lack of training, misunderstanding, as well as an unergonomic work environment, stress, and unclear or complicated SOPs also increase the risk of human error. The use of methods such as CREAM (Cognitive Reliability and Error Analysis Method) is employed to evaluate human reliability and predict Human Error Probability (HEP) in complex cognitive tasks. SHERPA is a method used to identify, predict, and reduce the potential for human error in a system. HEART (Human Error Assessment and Reduction Technique) is a technique designed to estimate the likelihood of human error based on specific working conditions. FMEA (Failure Modes and Effects Analysis) is a systematic method used to identify and analyze potential failures in a process or system.
Keywords: Human Error, Production Process, Failures.

ABSTRAK

Human error merupakan salah satu faktor utama kesalahan manusia penyebab paling umum dari kegagalan produksi yang dapat berdampak pada kualitas produk, efisiensi operasional, dan keselamatan kerja. Penelitian ini bertujuan untuk menganalisis peran human error dalam proses produksi dengan menggunakan berbagai metode analisis yang ada di literatur. Penelitian ini menggunakan pendekatan *Systematic Literature Review* (SLR) untuk mengeksplorasi literatur terkait *Human Error* pada proses produksi, dengan tujuan mengidentifikasi, mengevaluasi dan menyintesis hasil dari studi-studi yang relevan. Penelitian ini menunjukkan bahwa 70-90% cacat kualitas dihasilkan dari human error, yang berdampak pada kualitas, peningkatan biaya operasional, serta risiko kecelakaan kerja. Penelitian menunjukkan bahwa faktor-faktor seperti kurangnya pelatihan, pemahaman yang tidak, selain itu, lingkungan kerja yang tidak ergonomis, stres, dan SOP yang tidak jelas atau rumit juga meningkatkan risiko kesalahan manusia. Penggunaan metode seperti CREAM (*Cognitive Reliability and Error Analysis Method*) digunakan untuk mengevaluasi keandalan manusia dan memprediksi Probabilitas Kesalahan Manusia (HEP) dalam tugas kognitif yang kompleks. SHERPA adalah metode yang digunakan untuk mengidentifikasi, memprediksi, dan mengurangi potensi kesalahan manusia dalam suatu sistem. HEART (*Human Error Assessment and Reduction Technique*) adalah teknik yang dirancang untuk memperkirakan kemungkinan kesalahan manusia berdasarkan kondisi kerja tertentu. FMEA (*Failure Modes and Effects Analysis*) adalah metode sistematis yang digunakan untuk mengidentifikasi dan menganalisis potensi kegagalan dalam suatu proses atau sistem.
Kata Kunci: Kesalahan manusia, Proses produksi, Kegagalan .

1. Introduction

The manufacturing process in an industry cannot be separated from errors [1]. This error can be caused by system errors or human errors [2]. System errors are mistakes that are usually caused by the system controlling the process, and if corrected, these errors will not occur again [3]. This is quite different from human mistake. Human mistake results from a lack of situational awareness, especially the perception of components within the process environment. Humans can be told about and frequently comprehend the proper processes, but owing to the system's complexity, something that should be done right cannot be executed. This is known as human mistake [4]. Therefore, the identification and analysis of human error has become an urgent necessity to enhance the reliability and safety of production systems [5].

Accident reports in the automotive cable industry are primarily relating to the hazardous category actions (human error). The two categories with the greatest impact on accidents in the automotive cable industry are a function of unsafe actions and unsafe conditions [2]. Non-compliant behavior includes cases where a system or component that is not covered by the method is attempted to be operated by the operator. Operating is one example devices due to unintentional errors or accidental actions, taking proactive measures or habits according to the operator's understanding (rather than procedures), and activating devices to check their suitability [5]. Some studies have provided a thorough overview of the theoretical underpinnings of control system optimization, but the influence of human mistakes (such as neglect, forgetfulness, inattentiveness, or carelessness) on production costs in industrial environments requires further investigation [6].

The probability of behaviors unrelated to procedures is predicted to depend on the situation and the likelihood of recovery, with various values of human error probabilities obtained ranging from 1 to 10−6. Sufficient operational experience, crew training, and the development of procedural techniques to reduce conflicts in operational aims during accident circumstances are extremely effective in decreasing mistakes [5]. The effect of human mistake on production processes, considering various Performance Shaping Factors (PSF) that influence Human Error Probability (HEP). HEP is estimated as a function of PSF, includes three distinct dimensions (namely, task error propensity, operator capability, and working environment characteristics within the production system) [7]. To limit the impact of human error, it is advised to undertake training, enhance operator awareness of the repercussions of mistakes, and include instructions into the manufacturing process [8].

Factors such as inadequate training, lack of safety awareness, and impatience during operations often serve as the main causes of errors. To address this issue, various studies suggest implementing comprehensive strategies, such as Poka-Yoke systems, data-driven analysis, and enhancing operator skills, to reduce risks and improve production efficiency and quality [9]. Human error continues to be a significant restriction that, if not handled, can lead to a variety of issues [10]. Correcting and preventing such errors is very helpful in improving product quality and saving time during the production process [9]. We investigate the impact of human errors on repairable manufacturing systems which might be at risk of random disasters over a countless planning horizon, in addition to the results for system capacity and inventory rules. We additionally derive the optimum coverage to minimize manufacturing costs based totally on system maintenance and stock control while assembly marketplace calls for over a limitless horizon [6].

Human errors primarily include operator mistakes in perceiving environmental information and decision-making errors. Human errors are resulting from a loss of state of affairs focus, that's the notion of additives in the system surroundings, the translation of their importance, and the projection of their function within the destiny [3] [7] [8]. The operator's potential failed to finish the specified movement [11]. Operator errors that lead to downtime result in not meeting cost targets. This observe develops an inverse most efficient price model for operator mission. The utility consequences display that the inverse optimal price method can reap price targets, reduce total losses caused by operators by using 5%, lower production losses with the aid of 34.3%, and reduce waste by way of 5.1%, whilst exertions fees expanded by using 8.3% [12].

2. Methods

This research employs a *Systematic Literature Review* (SLR) approach to explore the literature related to Human Error in the manufacturing process, with the aim of identifying, evaluating, and synthesizing the results of relevant studies. This approach is carried out systematically and structurally.

The literature search was conducted using three main databases *Scopus, ScienceDirect*, and *Google Scholar*. The keywords used for the search are formulated based on the key concepts of the research topic, namely *Human Error, Reliability in the production process, and Error Analysis*. The search was conducted on articles published between 2012 and 2024. Articles published in journals or conferences. Figure 1 shows that out of 20 studies, 13 were published in journals and 7 in conferences, illustrating the distribution of publication numbers based on journals. From this diagram, it is evident that *Reliability Engineering and System Safety* is the Journal with the most publications, while other journals such as *Manufacturing Systems, Sustainability,* and others have a smaller and almost equal number of publications. Meanwhile, the *Conference Paper* has the highest number of publications compared to other conferences such as the *Conference on Industry 4.0 and Smart Manufacturing and the Conference on Applied Human Factors and Ergonomics*, which each have only one publication.

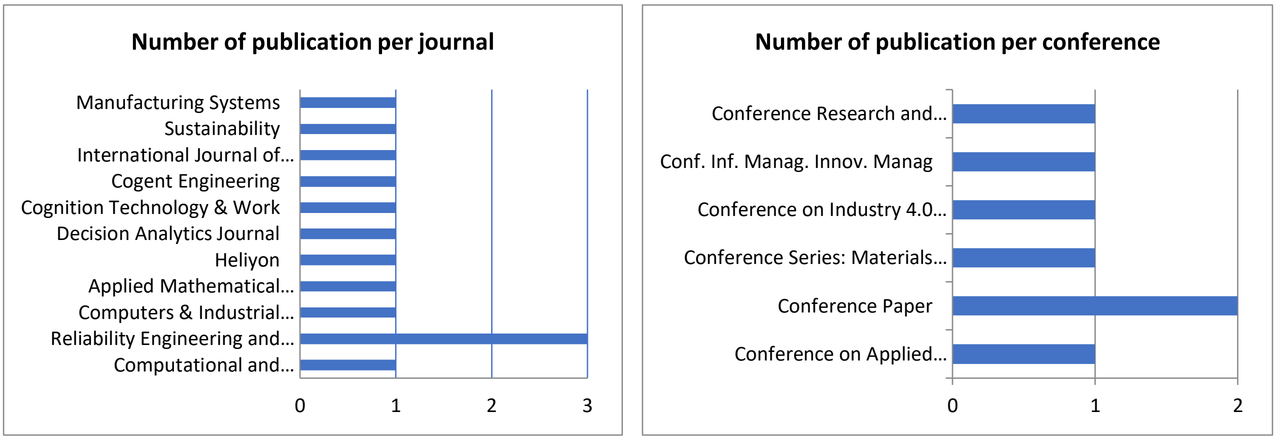

Figure 1. Number of publication per journal or per conference

3. Result and Discussion

3.1. The Impact of Human Error

Aside from human error, there are additional faults that result in a drop in quality, manufacturing process difficulties, and lower efficiency. These mistakes, which can dramatically diminish competitiveness, can occur from a variety of sources, including raw materials, technology, and the manufacturing process [13]. In our daily lives, human errors are very common because everyone can make at least a few mistakes every day. However, human error has become a major concern regarding dependability of the system because the functioning of the majority of these systems rely on contact with the operator to maintain them proper functions [14]. Additionally, Workers in the manufacturing business are more likely to have workplace accidents and injuries because their tasks demand extensive contact between people and machines [1].

Several literatures suggest that around human error accounts for 70% to 90% of quality concerns in the manufacturing process, either directly or indirectly [15]. In addition to causing quality defects, human errors have impacts such as leading to very high costs or even dangers in the workplace [1]. Reyes identified and classified human errors and the factors causing accidents, focusing primarily on organizational injuries in high-danger structures, while neglecting workplace accidents in the manufacturing sector, which have a frequency of 62.66%, having the greatest contributing factor discovered in the dangerous condition category [2]. Table 1 contains a list of selected studies discussing the impact of human error on the production process.

Table 1. The Impact of Human Error on The Production Process

No	Impact of Human Error	Journal
1	Occupational Safety	[1], [2], [3], [7], [16], [17]
2	Product Quality	[4], [5], [9], [8], [13], [15], [18]
3	Operational Efficiency	[6], [10], [11], [12], [14], [19]

Identifying errors in the production process and preventing those errors from occurring is very helpful in improving product quality and saving time during the production process [9]. Human error continues to be a significant restriction that, if not handled, can lead to a variety of issues [17]. Human errors must be avoided to reduce economic costs related with flaws and wasteful waste [20]. There are three different dimensions for evaluating human error (namely, job error patterns, operator competencies, and work environment features in the production system) [19]. Operators integrated into the system are able to utilize and enhance individual skills in both physical and cognitive aspects [21].

Errors in the execution of incorrect procedures may occur when operators follow inappropriate procedures due to misdiagnosing the situation, or when they operate devices improperly even though the correct procedures are being followed [5]. Maintenance and production procedures are crucial for the quality and reliability of products and their components [22]. Breakdowns in machinery and equipment can force operators to resort to manual methods or troubleshoot issues without the appropriate tools [23]. To determine the best efficient methods for reducing laboratory accidents in the education sector [26].

3.2. Factors Causing Human Error

Factors causing human error, such as task errors, operator capability, work environment characteristics, discipline, and adherence to SOPs, can affect the production process. These factors are categorized based on the types of errors that frequently occur, as well as the conditions and variables that contribute to the occurrence of errors. Table 2 shows the factors causing human error in the manufacturing process.

Table 2. Factors Causing Human Error In The Production Process

No	Error Factor	Journal
1	Assignment Error	[2], [3], [8], [12], [19]
2	Operator's Ability	[1], [6], [9], [14], [17], [20]
3	Characteristics of the Work Environment	[2], [7], [10], [11], [15]
4	Discipline and Compliance SOP	[4], [5], [8], [13], [21], [22]

Many studies have shown that human error is a major factor causing failures in the production process across various industries. Task errors often occur due to the operator's inadequate understanding of the correct work procedures. This research emphasizes that mistakes like these often occur in situations where operators are undertrained or not given clear instructions [2], it is also emphasized that errors in tasks are often the result of poor selection of incompetent operators to perform certain tasks, which in turn leads to significant operational inaccuracies [3]. Reinforces the finding that operators dealing with complex or routine processes experience higher task error rates [8].

The operator's ability is another important factor that influences human error in the production process. How the technical skills of operators affect the accuracy of task execution in the manufacturing industry [1]. Concluded that adequate training can reduce the likelihood of human error, but a continuous approach is still necessary for operators to keep up with the latest technological developments [6]. The mental and physical abilities of operators, including reaction speed and endurance, have a direct impact on the probability of errors [9]. Which found that errors often occur because operators experience physical or mental fatigue, which reduces their ability to think clearly and make quick decisions [20].

That physical conditions such as lighting, noise, and workplace layout significantly affect operator performance [7]. That an unergonomic work environment, such as poorly positioned tools or uncomfortable workstations, can reduce operator productivity and increase the risk of errors [10] [11]. An overly stressful environment or one with tight time demands can also lead to an increase in error rates, it is explained that a good work environment is not only about physical conditions but also about the psychological atmosphere. This research found that pressure from superiors or a highly competitive environment can prompt operators to rush in completing tasks, which ultimately increases the likelihood of errors occurring [15] [2].

3.3. Analysis Method

Each method has a different approach to identifying and evaluating factors of human error, whether from technical, cognitive, or behavioral perspectives. These methods are often applied in various industrial contexts to reduce operator errors and enhance the reliability of production processes. Table 3 presents various analysis methods used in research related to human error.

Table 3. Analysis Methods For Human Error

No	Analysis Method	Journal
1	RCA	[21]
2	FMEA	[9], [13], [24]
3	FTA	[15], [25]
4	CREAM	[14], [15], [26], [27]
5	SHERPA	[4], [20], [28], [29], [30]
6	HEART	[4], [20] , [28], [29], [30]
7	HTA	[23],[8]
8	HEC	[8]
9	PHEA	[8]
10	SACFHA	[1], [2]

The working environment has an impact on human reliability and the estimation of Human Error Probability (HEP) [7]. Studies on human dependability and the chance of inaccuracy have created attention in numerous sectors because of its relevance in guaranteeing operational safety and efficiency. Researchers use the Cognitive Reliability and Error Analysis Method (CREAM) to analyze the impact of environmental conditions on Human Error Probability (HEP). The cognitive demand profile provides an early assessment of "where potential problem areas might be." Meanwhile, the cognitive function failure profile displays the most common forms of mistakes in the activity [27]. The CREAM method includes the ability to comprehensively and objectively identify the root causes of human errors, as well as providing steps to prevent the recurrence of specific errors [31].

Human errors that lead to product defects can be analyzed using Root Cause Analysis (RCA), which is crucial for improving the quality and productivity of manufacturing [21]. Addresses issues in the door production process where defects, primarily caused by human factors, are identified as the main cause. (human error). This issue can be resolved by conducting a human error analysis using the *Systematic Human Error Reduction and Prediction Approach* (SHERPA) and the *Human Error Assessment and Reduction Technique*. (HEART) [4]. SHERPA method is used to predict the likelihood of human error and the HEART method is used to determine the value the likelihood of operator error while performing their job [28]. The SHERPA method's study outcomes display that the kinds of mistakes that regularly occur in the tire retreading method are many incorrect operator movements [29]. SHERPA assesses human reliability and makes use of this information to estimate the outcomes gained from various work break designs and distributions, hence providing the opportunity to discover the ideal break arrangement, both in terms of time and distribution across shifts [30].

Human errors that lead to defective products using Hierarchical Task Analysis (HTA), Human Error Calculator (HEC), and Predictive Human Error Analysis (PHEA) to analyze human errors in the sugar manufacturing process, it reveals that human errors can significantly reduce the quality of the produced sugar and emphasizes the importance of identifying and evaluating the risks associated with these errors [8].

On addressing product defects caused by human error, they applied the Failure Mode and Effects Analysis (FMEA) method to analyze and calculate the Risk Priority Number (RPN) of the errors that occurred, and subsequently developed an automated Poka-Yoke system based on the FMEA error analysis [9]. The refined FMEA is divided into four major stages: determining the need for hazard assessment (context identity, enterprise system identity, group formation, assessment approach determination, and training), chance identification (brainstorming capability disasters, list the risk check in), risk analysis, and evaluation (danger parameter evaluation, RPN calculation, chance prioritization, and manipulate guidelines) [24]. The FMEA yields the Risk Priority Number (RPN) value, which is used to evaluate probable important causes that must be evaluated using FTA. This study identified ten significant potential causes: asset fire, asset difficult to save, panic victims, absent witnesses/owners, slipping officers, water source far from the location, delayed rescue of victims, trapped victims, officers struck by debris, and officers inhaling excessive smoke (congestion) [25].

Accidents in the manufacturing industry are related to unsafe actions. (human error). This study highlights the importance of worker health and suggests that identifying contributing factors through the Systematic Analysis and Classification of Human Factors in Accidents (SACFHA) taxonomy provides useful information for occupational health professionals to design more effective accident prevention programs [1] [2].

4. Conclusion

Human error in the production process often becomes the main cause of operational failures in various industries. Research shows that factors such as a loss of education, inadequate knowledge of labor processes, and the physical and mental condition of operators play a substantial role within the occurrence of errors. In addition, an unergonomic work environment, stress, and unclear or complicated SOPs also increase the risk of human error. The use of methods such as CREAM (*Cognitive Reliability and Error Analysis Method*) is employed to evaluate human reliability and predict *Human Error Probability* (HEP) in complex cognitive tasks. SHERPA (*Systematic Human Error Reduction and Prediction Approach*) is a method used to identify, predict, and reduce potential human errors within a system. HEART (*Human Error Assessment and Reduction Technique*) is a technique designed to estimate the likelihood of human errors based on specific working conditions. FMEA (*Failure Modes and Effects Analysis*) is a systematic method used to identify and analyze potential failures in a process or system. Research shows that about 70-90% of quality defects stem from human error, which not only affects quality but also increases operational costs and the risk of accidents in the workplace. Therefore, it is important to conduct an in-depth analysis of the factors causing human error in order to enhance system reliability and workplace safety.

To reduce human error and enhance production reliability, it is essential to optimize the work environment to minimize stress factors for operators, provide regular training to ensure workers better understand operational and safety procedures, and utilize technology such as Poka-Yoke to automatically prevent mistakes. Additionally, conducting regular evaluations of the production process and operator performance is crucial to ensure that corrective actions can be implemented swiftly. Simplifying tasks and leveraging monitoring technology can also help prevent errors and accidents, thereby improving workplace safety and production efficiency.

References

[1] J. A. Yeow, M. K. B. J. Khan, and P. K. Ng, “Enforcement of safety and health policy reduces human error in SMEs in the manufacturing industry,” *Adv. Sci. Lett.*, vol. 23, no. 11, pp. 10656–10659, 2017, doi: 10.1166/asl.2017.10124.

[2] R. M. Reyes, J. de la Riva, A. Maldonado, A. Woocay, and R. de la O, “Association between Human Error and Occupational Accidents’ Contributing Factors for Hand Injuries in the Automotive Manufacturing Industry,” *Procedia Manuf.*, vol. 3, no. Ahfe, pp. 6498–6504, 2015, doi: 10.1016/j.promfg.2015.07.936.

[3] U. Alkhaldi, M, Pathirage, C and Kulatunga, “The role of human error in accidents within oil and gas industry in Bahrain,” *Usir*, vol. /, no. /, pp. 821–834, 2017.

[4] N. Sembiring, M. M. Tambunan, and M. Febriani, “Human error analysis on production process of door products with SHERPA and HEART method,” *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 505, no. 1, 2019, doi: 10.1088/1757-899X/505/1/012025.

[5] Y. Kim, S. Yeong, J. Park, and J. Kim, “Empirical study on human error probability of procedure-extraneous behaviors,” *Reliab. Eng. Syst. Saf.*, vol. 227, no. September 2021, p. 108727, 2022, doi: 10.1016/j.ress.2022.108727.

[6] B. Emami-Mehrgani, W. P. Neumann, S. Nadeau, and M. Bazrafshan, “Considering human error in optimizing production and corrective and preventive maintenance policies for manufacturing systems,” *Appl. Math. Model.*, vol. 40, no. 3, pp. 2056–2074, 2016, doi: 10.1016/j.apm.2015.08.013.

[7] S. Digiesi, F. Facchini, G. Mossa, and M. Vitti, “A model to evaluate the Human Error Probability in inspection tasks of a production system,” *Procedia Comput. Sci.*, vol. 217, pp. 1775–1783, 2022, doi: 10.1016/j.procs.2022.12.377.

[8] F. Musavi, R. Hekmatshoar, M. Fallahi, A. Moradi, and M. Yazdani-Aval, “Identifying and preventing human error in the sugar production process: A multi-stage approach using HTA, HEC and PHEA techniques,” *Heliyon*, vol. 10, no. 9, p. e29687, 2024, doi: 10.1016/j.heliyon.2024.e29687.

[9] M. Chafidh and A. Ayyubi, “Implementation of Poka-Yoke System to Prevent Human Error in Material Preparation for Industry,” no. July, 2020, doi: 10.1109/ISITIA49792.2020.9163707.

[10] A. Modares, V. Bafandegan Emroozi, H. Gholinezhad, and A. Modares, “An integrated Cognitive Reliability and Error Analysis Method (CREAM) and optimization for enhancing human reliability in blockchain,” *Decis. Anal. J.*, vol. 12, no. June, p. 100506, 2024, doi: 10.1016/j.dajour.2024.100506.
[11] A. Kumar, “Sensitivity and reliability evaluation for a thermal power plant subject to complex failures and human error,” *Multidiscip. Model. Mater. Struct.*, vol. 15, no. 5, pp. 895–912, 2019, doi: 10.1108/MMMS-10-2018-0165.
[12] L. Zhang, Z. Li, Y. Yang, and M. Cui, “Human error unplanned downtime inferring and job-operator matching based on inverse optimal value method,” *Comput. Ind. Eng.*, vol. 149, no. February, 2020, doi: 10.1016/j.cie.2020.106840.
[13] B. Ostadi and M. S. Masouleh, “Application of FEMA and RPN techniques for man-machine analysis in Tobacco Company,” *Cogent Eng.*, vol. 6, no. 1, pp. 1–13, 2019, doi: 10.1080/23311916.2019.1640101.
[14] C. Nan and G. Sansavini, “Developing an agent-based hierarchical modeling approach to assess human performance of infrastructure systems,” *Int. J. Ind. Ergon.*, vol. 53, pp. 340–354, 2016, doi: 10.1016/j.ergon.2016.04.002.
[15] L. Yang, Q. Su, and L. Shen, “A novel method of analyzing quality defects due to human errors in engine assembly line,” *Proceeding 2012 Int. Conf. Inf. Manag. Innov. Manag. Ind. Eng. ICIII 2012*, vol. 3, pp. 154–157, 2012, doi: 10.1109/iciii.2012.6339943.
[16] A. Noroozi, N. Khakzad, F. Khan, S. Mackinnon, and R. Abbassi, “The role of human error in risk analysis : Application to pre- and post-maintenance procedures of process facilities,” *Reliab. Eng. Syst. Saf.*, vol. 119, pp. 251–258, 2013, doi: 10.1016/j.ress.2013.06.038.
[17] D. Lee, H. Kim, K. Koo, and S. Kwon, “Human Reliability Analysis for Fishing Vessels in Korea Using Cognitive Reliability and Error Analysis Method (CREAM),” *Sustain.* , vol. 16, no. 9, pp. 1–26, 2024, doi: 10.3390/su16093780.
[18] J. Böllhoff, J. Metternich, N. Frick, and M. Kruczek, “Evaluation Of The Human Error Probability In Cellular Manufacturing,” *Procedia CIRP*, vol. 55, pp. 218–223, 2016, doi: 10.1016/j.procir.2016.07.080.
[19] S. Digiesi, F. Facchini, G. Mossa, and M. Vitti, “A model to evaluate the Human Error Probability in inspection tasks of a production system,” *Procedia Comput. Sci.*, vol. 217, no. 2022, pp. 1775–1783, 2022, doi: 10.1016/j.procs.2022.12.377.
[20] Y. Torres, S. Nadeau, and K. Landau, “Classification and quantification of human error in manufacturing: A case study in complex manual assembly,” *Appl. Sci.*, vol. 11, no. 2, pp. 1–23, 2021, doi: 10.3390/app11020749.
[21] K. Wang, C. Liu, and Y. Lu, “Ensemble Bayesian Network for root cause analysis of product defects via learning from historical production data,” *J. Manuf. Syst.*, vol. 75, no. November 2023, pp. 102–115, 2024, doi: 10.1016/j.jmsy.2024.06.001.
[22] A. Bargelis, D. Čikotiene, and Z. Ramonas, “Impact of human factors and errors for product quality and reliability in the integrated approach of product and process design, maintenance and production,” *Mechanika*, vol. 20, no. 1, pp. 92–98, 2014, doi: 10.5755/j01.mech.20.1.5258.
[23] C. F. Hasibuan, P. Yudi Daeng, and R. R. Hasibuan, “Human Reliability Assessment Analysis with Human Error Assessment and Reduction Technique (HEART) Method on Sterilizer Station at XYZ Company,” *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 851, no. 1, 2020, doi: 10.1088/1757-899X/851/1/012019.
[24] A. P. Subriadi and N. F. Najwa, “The consistency analysis of failure mode and effect analysis (FMEA) in information technology risk assessment,” *Heliyon*, vol. 6, no. 1, p. e03161, 2020, doi: 10.1016/j.heliyon.2020.e03161.
[25] T. H. Febriana and H. Hasbullah, “Analysis and Defect Improvement Using FTA , FMEA , and MLR Through DMAIC Phase : Case Study in Mixing Process Tire Manufacturing Industry,” vol. 54, no. 5, pp. 721–731, 2021.
[26] Y. He, N. S. Kuai, L. M. Deng, Z. L. Wang, and M. J. Peng, “An investigation into accidents in laboratories in universities in China caused by human error: A study based on improved CREAM and SPAR-H,” *Heliyon*, vol. 10, no. 7, 2024, doi: 10.1016/j.heliyon.2024.e28897.
[27] K. Schemeleva and C. Caux, “Human error probabilities computation for manufacturing system simulation using CREAM To cite this version : HUMAN ERROR PROBABILITY COMPUTATION FOR,” no. June, 2012.
[28] Y. Mauluddin and F. Azzahra, “Evaluasi Human Error Penyebab Kecacatan Produksi pada Usaha Konveksi Manda Hijab Cicalengka,” *J. Kalibr.*, vol. 20, no. 1, pp. 68–76, 2022, doi:

10.33364/kalibrasi/v.20-1.1132.

[29] B. Bakhtiar, S. Syukriah, and M. Iqbal, "Measurement of Human Work Reliability Using Systematic Human Error Reduction and Prediction Approach and Human Error Assessment and Reduction Technique Method," *Int. J. Eng. Sci. Inf. Technol.*, vol. 2, no. 1, pp. 158–166, 2022, doi: 10.52088/ijesty.v2i1.244.

[30] V. Di Pasquale *et al.*, "A Simulator for Human Error Probability Analysis (SHERPA)," *Reliab. Eng. Syst. Saf.*, 2015, doi: 10.1016/j.ress.2015.02.003.

[31] R. Kubota *et al.*, "Analysis of Organisation-Committed Human Error by Extended CREAM," *Cogn. Technol. Work*, vol. 3, no. 2, pp. 67–81, 2001, doi: 10.1007/pl00011525.