Report On

Assessing Training Needs to Minimize Production Defects at K.M. Furniture

By

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An internship report submitted to the Brac Business School in partial fulfilment of the requirements for the degree of
Bachelor of Business Adminitration

Brac Business School
Brac University
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Declaration

It is hereby declared that.

1. The internship report submitted is my/our own original work while completing a degree at Brac University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Letter of Transmittal

Dr. Syed Far Abid Hossain,
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Subject: Submission of BBA dissertation on Training needs at K.M. Furniture Dear

Sir,

I've enclosed my dissertation on "***Assessing Training Needs to Minimize Production Defects at K.M Furniture.***" I submitted this material to partially fulfil the requirements for my BBA. I'm grateful for your review and guidance. If you need any changes or documents, just let me know.

I trust that the report will meet the desires.

Sincerely yours,

Md .Tuhidur Rahman Khan

Student ID: 18304138

BRAC Business School
BRAC University
Date: 06/10/2025

Non-Disclosure Agreement

This agreement is made and entered into by and between K.M. Furniture and the undersigned student at Brac University…….

Acknowledgement

My dissertation would not have been possible if not for the help and support of everybody. I sincerely thank my supervisor and committee for their useful comments, patient supervision, and high standards, which have shaped this study. I want to thank K.M. Furniture for the great work. I appreciate the team and members of the furniture for granting access, sharing their time, and their willingness to be interviewed and observed. I would first like to thank my colleagues and friends for their helpful critiques. I also want to thank my family for their endless love, patience and motivation through this journey.

Executive Summary

This dissertation evaluates training gaps in K.M. Furniture for defect minimization. The article discusses a case study that used interview and observational data coupled with defect log and HR record analysis to reach the conclusion that training is happening but is incoherently scheduled, not role-specific, and weakly reinforced on the shop floor. Staff have a good grasp of quality standards but a moderate understanding of error prevention. On the whole, they have moderate skills and application ability. Maintenance is behind Production, Packaging, and Quality Control on the issue. After training, the pilot program detected fewer defects, indicating an impact. Some suggestions include implementing role-focused curricula aligned with Pareto defects, scheduling quarterly refreshers, enhancing coaching by supervisors, upskilling for maintenance, applying blended delivery methods, and strengthening the evaluation process at levels 3-4 attributed to FPY, defects per unit and the number of hours spent on rework.

Keywords

Training needs assessment; defect reduction; furniture manufacturing; standard work; supervisor coaching; refresher training; skill matrices; CNC setup; finishing quality; Kirkpatrick evaluation; first-pass yield; continuous improvement.

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Chapter 1: Introduction

1.1 Background of the Study

K.M. Furniture is a manufacturing firm located in Bangladesh. The furniture sector of Bangladesh is highly competitive. The company manufactures all kinds of panel and solidwood products for the industry (Tennant, 2017). The company uses a variety of processes to make the products. In the production process, the parts are prepared and cut or machined and then assembled.

Training is key to the manufacturing performance lever. When jobs efficiently train the operators, assemblers and finishers in real time on the interpretation and understanding of the technical drawing, setting up and calibration of the machine or equipment, handling of material, following the control plans for the manufacture of the product, and detection & diagnosis of defects (Wilsson and Spolén, 2024). Training does more than just improve technical expertise. It helps in safety, 5S lean routines, and cross-functional communication. All of this stabilizes processes and reduces variability. Research into operations and human factors has demonstrated that solid training systems are associated with improvements in first-pass yield, scrap and rework, customer complaints, and lead times (Xiong et al., 2020).

K.M. Repeated defects are found in furniture related to wrong dimensions, misaligned joining, edge chipping, defects due to sanding swirl marks and defects due to finishing, which were observed on the furniture and damage caused during handling (Lin et al., 2019). There are, therefore, indications of gaps in competencies required and those which were shown. When product mixes change, training content and training delivery must also change to keep pace. It is important to investigate systematically to identify and close competence gaps which cause production failure.

1.2 Problem Statement

K. M. Furniture is suffering from defects in production, which is causing an increase in rework, scrap, warranty, lead time, and on-time delivery costs. Defect patterns differ by shift, line and product family, indicating process instability and uneven capability. Initial evidence suggests that training-related factors may be at fault (Kusiak, 2019). Onboarding is largely taskshadowing instead of competency-based; refresher training is ad hoc; new process

requirements are not cascaded consistently; and there is no formal TNA to align roles, skills, and standards (O'Brien et al., 2019).

The consequences are multifold. Costly defects increase the cost of each unit and occupy capacity for rework. They hinder flow, cause bottlenecks, and use up supervisory attention. In business, they pose a risk to customers and the brand (Skorupińska, Hitka and Sydor, 2024). They can affect the morale of the employees and entrench workarounds which do not conform to the standard work. If the diagnosis of training needs is not structured and related to the causation of defects, then the intervention will be generic in nature (Mittal, Dhiman and Lamba, 2019). Also, this type of intervention will not offer long-term and in-depth improvement. To identify relevant competencies and design training, it is important to conduct a TNA for defects at source.

1.3 Research Aim and Objectives

Aim

This research aims to assess training needs to minimize production defects at K.M. Furniture.

Objectives

- To explore and understand the underlying reasons for production defects at K.M. Furniture by assessing the perceived training needs of its production staff.
- To get a better understanding of the current workflow from the employee perspective, qualitatively benchmark K.M. Furniture's moves against industry leaders, and create actionable recommendations for a focused training program.

1.4 Research Questions

- How do production employees and managers at K.M. Furniture perceive the causes of production defects?
- What are the perceived skill, knowledge, and process gaps that contribute to these defects?
- What are the lived experiences of employees within the current production and quality control system?

1.5 Significance of the Study

The linking of quality losses to competency gaps will assist senior management in their investment decisions with the help of the study. The study will also assist in prioritisation of training interventions according to expected impact. This report will provide the HR and Learning function with a competence framework, TNA process and an actionable curriculum (modules, methods and assessment) aligned to the operating requirements. The teams responsible for capacity and quality production will connect the reasons defects happen to the learning outcome of each position, standard work reinforcement, and coaching on the job (Kumar et al., 2022). The outcomes include improved first pass yield with reduced rework and scrap, better on-time delivery and customer satisfaction, which will ultimately lower cost per unit and improve competitiveness of the organization.

Chapter 2: Literature Review

2.1 Introduction to the Chapter

This chapter combines theory and practice to show how the training needs assessment can help to minimize production defects. The initial part gives a clarification of training and development in manufacturing contexts, followed by an outline of the basic frameworks dealing with needs assessment and training evaluation, such as McGehee and Thayer's threelevel analyses, Kirkpatrick's four-level model, and Human Capital Theory. Next, the chapter analyses the anatomy of production defects, that is, typologies, drivers and consequences, and concepts of quality management, including TQM and Six Sigma. The next section looks at evidence that links training to measurable quality improvements, focusing on manufacturing settings similar to furniture production. The chapter ends with practical suggestions on how to identify training needs and summarizes the main gaps the dissertation fills.

2.2 Concept of Training and Development

Training involves organized and systematic efforts aimed at developing knowledge, skills, and behavior which enable people. In manufacturing, it usually includes instruction in standard operating procedures (SOPs), equipment set-up and calibration, measuring and inspection techniques, handling materials, safety and problem-solving routines (Kristensen and Remmen, 2019). Development focuses on broader aspects like capabilities of leadership, flexibility, cross-functional understanding, future role preparedness, etc. Training efforts mainly focus on current performance. Development enhances resilience and capacity for innovation (Hartini et al., 2020).

It is essential to train well for stability and quality in production environments. The main goals are to reduce variation using standard work, improve first-pass yield using early detection of defects, reduce scrap and rework using correct methods of work and improve flow using fewer stoppages caused by errors. Manufacturers use a wide range of training methods (Kumar and Rodrigues, 2020). These include on-the-job training (OJT) and job instruction (e.g. Training Within Industry), classroom and workshop-based off-the-job training, set-up simulations and mock-ups, e-learning and microlearning modules for standard operating procedure (SOP)

updates, mentoring and coaching, apprenticeships for skilled trades (e.g. machining, finishing), job rotation to enhance flexibility and visual aids and job aids (checklists, one-point lessons).

On-the-job coaching plus hands-on practice with short digital modules are increasingly combined to maximize transfer through blended learning (Ayala et al., 2017). An efficient training system incorporates assessment (of entry, formative and summative), strengthens standard work and builds in feedback loops for continuous improvement.

2.3 Theoretical Frameworks on Training Needs Assessment

McGehee and Thayer's Three-Level Analysis

The classic framework organizes training needs assessment (TNA) in three views. The operational level examines strategic goals, environmental impacts, quality standards, and cultural factors that enable or constrain progress. Organizational trainers need to ensure the training is scaled for business purposes (Ding et al., 2020). One example is the training on techniques that lessen defects or employ to shorten lead-time. The task level compares job tasks and workflow to identify how much knowledge, skill and other conditions are needed to perform the job competently (Xiong et al., 2020). The sequence for setting up the machine, measuring system required, Tolerance reading, Finishing techniques, etc. The specific capacities, performance deficiencies, and readiness to learn of each individual may be assessed through observation, assessment and comments of the supervisors (Ersöz, Güven and Ersöz, 2022). This level ensures that the wrong programs are not implemented and that the content of the task analysis is relevant to the mechanisms of defects. At the individual level, analysis prevents a one-size-fits-all training program, which ignores the needs and wants of individuals depending upon their role (Tennant, 2017).

Kirkpatrick's Four-Level Evaluation Model

Kirkpatrick suggests four levels of evaluation for training. Level 1 (Reaction) looks at how satisfied participants were and whether they found it relevant. Level 2 (Learning) looks at how much knowledge and skills were acquired (Guzel and Shahbazpour Asiabi, 2022). Level 3 (Behaviour) looks at whether these trainees are able to transfer to the job – i.e. are they able to use the different methods learnt and follow the SOPs. Level 4 (Results) looks at what happened at the organisational level – have defect rates come down, improved first pass yield, lower

customer complaints, and lower cost of quality. In situations emphasizing defects, for meaningful assessment to happen, one needs to move forward from Levels 1–2 to Levels 3–4 (Mittal et al., 2019). At these levels, a consistent change in the behaviour of those trained brings about measurable changes in quality, which can affirm the effectiveness of everyone's training. Kirkpatrick is often supplemented by manufacturing organizations with operational metrics dashboards (e.g. defects per unit, DPMO, FPY, OEE) to tie learning to results (De los Rios and Charnley, 2017).

Human Capital Theory

According to Human Capital Theory, training helps workers become more productive, which makes it an investment. Organizations benefit by improving technical, cognitive, and sociobehavioral skills through organization-related skill training. Also, they gain returns through chronic skill training. According to the theory, resources should be allocated smartly, i.e., training should be done when the marginal product gain is maximum. A process with a high defect rate, complex setup, and a critical to quality (CTQ) process is well-suited. In the case of K.M. Furniture, actions which are most associated with the generation of defects and quality risk should be given priority so as to optimize the return from training spend (Albukhitan, 2020).

2.4 Production Defects in Manufacturing

Production defects are nonconformities of outputs with specified requirements. Some of the common types are dimensional discrepancies, surface defects, functional defects, finishing defects and defects caused by mishandling and/or incorrect assembly (Wilsson and Spolén, 2024). Furniture manufacturing process variability can occur from the materials (e.g. wood density, wood moisture), various precision requirements in joinery and machining and sensitivity in finishing operations (Tortorella, Vergara and Ferreira, 2016).

The defects one encounters may have costly rework and scrap, schedule disruption and delivery delays, reduced ability to provide value-added production, increased warranty exposure and customer dissatisfaction, brand reputation erosion, etc. Quality management disciplines provide countermeasures (O'Brien et al., 2019). TQM focuses on prevention, standardization, employee involvement and continuous improvement. Six sigma is all about decreasing variations and defects. This is done through the use of the DMAIC cycle. DMAIC refers to the

Define, Measure, Analyze, Improve, Control cycle. Similarly, it uses various statistical tools, such as SPC and capability analysis (Skorupińska, Hitka and Sydor, 2024). Furthermore, it also has root cause analysis, which uses the Ishikawa diagram and the 5 Whys method. Six Sigma uses CTQ in process improvements. Both approaches place the human capability system center stage, including skills, adherence to standard work and problem-solving proficiency (Winarso and Jufriyanto, 2020).

2.5 Link Between Training and Production Quality

Research and practice suggest that well-designed training programs can lower the production flaws of manufactured goods for the client and business. This link operates through three primary pathways (Megawati, Wicaksono and Nurkertamanda, 2020a). The usefulness of training lies in prevention and supplementation, especially earlier on. Using SOPs, the staff set the parameters for the equipment and inspections so they 'get it right first time'. When machining is done properly to achieve the required tolerances, standard sanding is done to prevent defects on the surface, and negotiated finishing prevents defects in the coating. Training can help stabilize processes through the corroboration of activities (Hartini et al., 2020).

Teaching best practices consistently, along with job aids and coaching, helps minimize drift in the process and ad-hoc workarounds that cause recurring defects. Organizations learn to solve problems through training, and it helps to improve the process. Firms can provide their staff with some essential quality techniques that they can employ in the workplace, such as a Pareto analysis and a root cause analysis, and some lean practices, such as 5S techniques, that can assist them in eliminating the causes of defects. In addition, cross-training helps an organization shift from one product to another (De los Rios and Charnley, 2017). Evidence from other industries and businesses in the sector suggests that training in technical skills and quality methods, as well as soft skills coaching, has a definite effect on defect rates, speed of learning and rework (Mittal, Dhiman and Lamba, 2019).

2.6 Identifying Training Needs

In order for a training program to be effective, the needs need to be accurately diagnosed. A useful TNA will include information gathered from a number of sources. These data are presented according to the three levels of analysis suggested by McGehee and Thayer (Kristensen and Remmen, 2019). A TNA needs to be conducted at the organizational level,

with a specific focus on the strategic business priorities. Through quality dashboards, customer complaints, warranty, audit reports, etc., all focused on high impact (reduction of complaints) (Ding et al., 2020). At the task or process level, workflows, control plans, and standard operating procedures (SOPs) need to be reviewed in order to clarify the knowledge and skills required for error-free performance. Methods for doing this include behavioral observation, task analysis and failure mode and effects analysis. Performance appraisals, competency assessments and skill matrices are used at the individual level in order to identify gaps in employee performance that can be addressed by training (Lin et al., 2019). This quantitative evidence should be complemented by extensive qualitative evidence from teacher interviews and focus groups that will help build an understanding of perceived barriers to learning. The multi-level data synthesis is used to priorities training content (Kumar and Rodrigues, 2020). An analysis of defect types can be used to determine which processes require immediate attention, while root cause analysis can be used to link the defects to specific behavioral or skill-based shortfalls. This ensures that training objectives are structured logically from organization-level objectives through process requirements to role-specific competency, to ensure there is continuous and sustainable improvement in quality (Kumar et al., 2022).

2.7 Summary of Literature Gaps

Many leaders agree that training reduces defects, but gaps remain. A large percentage of studies perform training generically and do not diagnose role- and process-specific competencies, which are linked to particular defect modes, thereby weakening the causal attribution (Guzel and Shahbazpour Asiabi, 2022). Often, evaluations are limited to learner reaction or knowledge tests, while there is low evidence at Kirkpatrick Levels 3–4, showing sustained behaviour change and quality impact. The third underrepresented theme is furniture manufacturing, especially in relation to material variability, craft–automation interface, and finishing sensitivities. One particular aspect that stands out is the lack of integration of TNA with realtime quality data; for example, linking the defect Pareto pattern directly to the courses offered and skill certification. The knowledge that staff operators and supervisors have is not sufficiently used (Ayala et al., 2017). This knowledge includes how defects happen and how to avoid them. Such knowledge can assist in training individuals. It also includes using training methods that fit the realities of a local situation.

This research focuses on overcoming the barriers found particularly in industry and applying structured TNA anchored on McGehee and Thayer's framework; designing evaluation with high-end Level 3–4 metrics to which the MNE is committed; utilizing production/quality data to help priorities competencies; and mining qualitative evidence from K.M. Furniture (Ersöz, Güven and Ersöz, 2022). The setting of furniture production is to bring contextual validity for the practical impact of defect reduction.

Chapter 3: Research Methodology

3.1 Introduction

The chapter describes the methodology used for the investigation of training needs regarding defects in production at K.M. Furniture. The research philosophy, approach and design will be outlined in detail, and justification will be provided against the aim and objectives. The chapter describes the methodology of collecting and analyzing the data. It also mentions the sampling design and the ethical issues involved in the research. In conclusion, the adopted methodology recognizes its own limitations. This research aims to ensure that the study is sufficiently rigorous, transparent and valid so that one can assess whether targeted training reduces production defects.

3.2 Research Philosophy

This study is grounded in a pragmatist research philosophy. Pragmatism doesn't remain in one system of reality or philosophy. Rather, the emphasis is on the research problem itself and adopts a plural approach, using 'what works' to answer. Since this research aspires to produce practical and implementable recommendations for K.M. Furniture, a pragmatist stance is highly suitable (Albukhitan, 2020). It combines quantitative data with qualitative data (or vice versa) (a mixed-methods) approach to get a full understanding of the problem. Positivism is usable for the analysis of measurable defect data; however, it will not provide any data with respect to the viewpoints and perceptions of the employees, and the "why" of human error.

3.3 Research Approach

An inductive approach will be adopted for this research. The inductive approach starts with specific observations and measures, seeking patterns and regularities from which broad generalizations and theories are developed. This is suitable as the research aims to gain an understanding of findings on K.M.'s training needs (Wilsson and Spolén, 2024). Design furniture from scratch instead of using any hypothesis. The research will collect detailed qualitative and quantitative data from the shop floor to identify emergent themes related to skill gaps and defect causation.

3.4 Research Design

For the research purpose, a case study design is applied to K.M. Furniture. A case study is a detailed and complex study of a social phenomenon which is happening in real life. The present design is well-suited to this study as it examines the interlinkage between training, employee performance, and production quality in a certain establishment in detail (Xiong et al., 2020). The matter of quality defects is not a straightforward, stand-alone problem but is woven into the company's culture, processes and systems. Researchers can investigate the contextual factors in more depth via a case study design.

3.5 Data Collection Methods

The research will collect the data with the help of mixed techniques. It will include both primary and secondary data sources.

The researchers will collect primary data by conducting semi-structured interviews among production employees. Interviews allow deeper exploration of what participants think causes defects, the gaps in our training and what participants feel they need to be able to do. The qualitative information contributes greatly to the understanding of the workforce's lived experience and tacit knowledge (Winarso and Jufriyanto, 2020).

Internal company documents will provide secondary data. It will consist of logs for production defects, quality control reports, rework records and existing human resources training manuals and materials.

3.6 Sampling Technique

The purposive sampling technique will be used to select semi-structured interview participants. According to Lin et al. (2019), purposive sampling involves choosing subjects who are representatives of the organization and have knowledge about the issues under consideration, and any other relevant subject.

3.7 Data Analysis Methods

The collected objects will be examined according to the type of data they possess via various analytical methods.

The individual will adopt descriptive statistics of the quantitative data on defect logs and quality reports. The study will establish the frequency, percentage, and mean of the best defects and frequency by the line or shift frequency percentage and mean (Tennant, 2017). Thematic analysis will be used in the analysis of qualitative data. The interviews were transcribed, coded to find the concepts and grouped the codes into themes based on their repetition (Skorupińska, Hitka and Sydor, 2024). The themes will help in revealing the causes of the production defects. The reasons such as limited training and others as viewed by the employees will be given.

3.8 Ethical Considerations

This research will adhere to strict ethical principles to protect the rights and well-being of all participants. Informed consent will be obtained from each participant before their involvement, ensuring they fully understand the purpose of the study and the nature of their participation (O'Brien et al., 2019). Confidentiality and anonymity will be guaranteed; all data will be anonymized to protect participants' identities, and findings will be reported in a way that does not allow for individuals to be identified. Participation will be entirely voluntary, and participants will be informed of their right to withdraw from the study at any time without consequence.

3.9 Limitations of the Study

This study has several limitations that should be acknowledged. First, due to its case study design, the findings may have limited generalizability to other companies, as they are specific to the context of K.M. Furniture (Mittal et al., 2019). Second, the small sample size used for the qualitative interviews, while appropriate for a case study, means the findings may not capture the full spectrum of opinions within the company.

Chapter 4: Findings and Analysis

4.1 Introduction

This chapter details and evaluates the data collected to assess K.M.'s training needs. Furniture. The interviews with 20 employees who work as operators, supervisors, and managers were semi-structured, while the secondary data covered the production defect report logs and HR training records from the last year. Additionally, production floors observe primary data.

4.2 Findings

4.2.1 Survey result presentation

Years of service and department

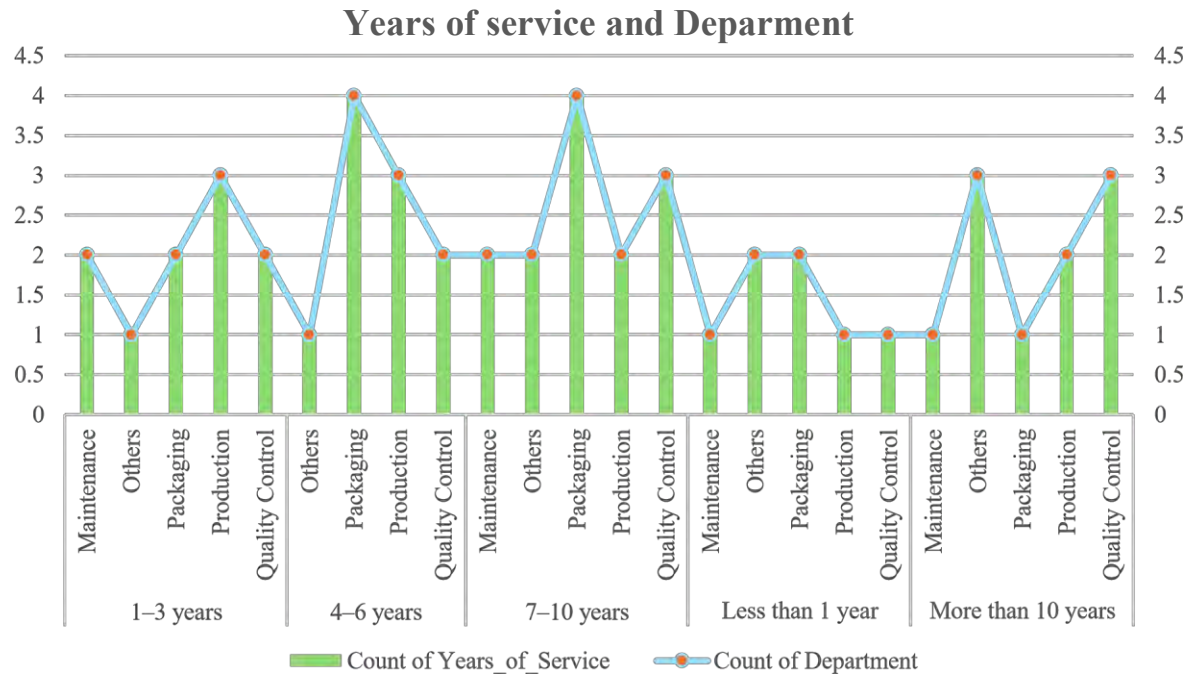

Figure 1 - Years of service and department (self-made)

The chart cross-tabulates the tenure bands across departments, giving the count for Years of Service and Department. The most represented groups are the mid-tenure groups (those with 4–6 and 7–10 years of experience), which show the existence of a core workforce that has significant experience. The 'less than 1 year' group is the least represented among all timings. Repeatedly, Production and Quality Control are appearing across all tenure bands at higher levels (Mittal, Dhiman and Lamba, 2019). This suggests they are the functions causing staffing to anchor. Overall, the distribution implies that the departments are well covered at the midcareer level.

Department wise sufficient training and error prevention training

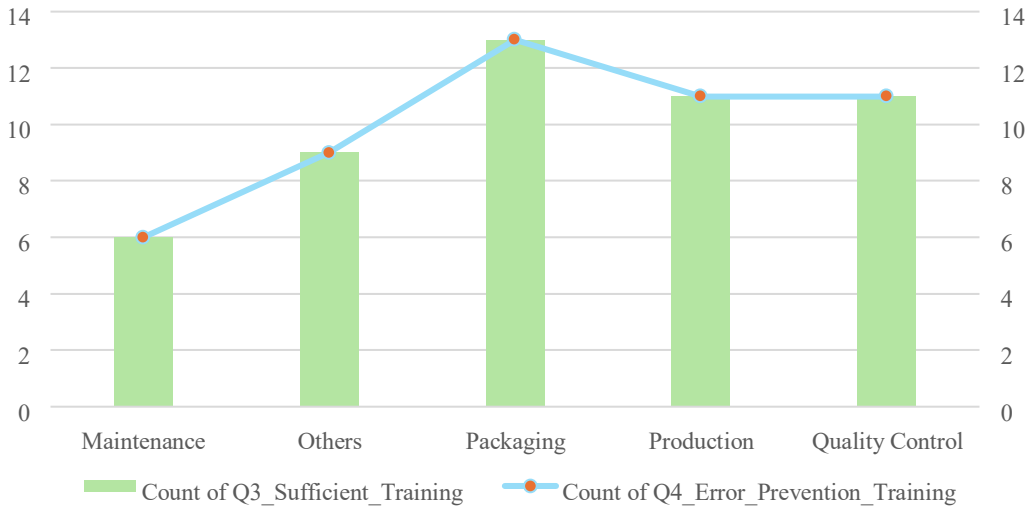

Figure 2 – Department-wise sufficient training and error prevention training (selfmade)

The graph shows by department the number of respondents in agreement that training is sufficient, and it explains avoidance of errors. Packaging has the most agreement on both measures. The next area with the most agreement is Production and Quality Control. This shows that the training provision on these areas is stronger, as well as the clear guidance in eliminating errors. Maintenance had the lowest number of responses, suggesting there is less training adequacy and clarity there. Overall, training perceptions are reasonably aligned between sufficiency and error-prevention content across departments, with Maintenance showing the biggest gap to address (Megawati, Wicaksono and Nurkertamanda, 2020a).

Apply skills, quality standards and defect reduction

Figure 3 – Apply skills, quality standards and defect reduction (self-made)

The departments are compared on the training implementation (Q5), understanding of the quality standards (Q6), and perceived reduction of defects (Q7). Staff in Packaging and Production are seen as applying skills and understanding of quality to the work. The Production function is seen as the most beneficial in reducing defects, while Quality Control is rated a close second. Out of all three indicators, maintenance is lowest, indicating weak application of skills, limited understanding of standards, and minor defect reduction (Megawati, Wicaksono and Nurkertamanda, 2020b). "Others" sits mid-range. Maintenance has the highest order of needs, as perceived defect reduction is associated with stronger application of skills and quality of knowledge.

Training frequency, Supervisor feedback and Need more training

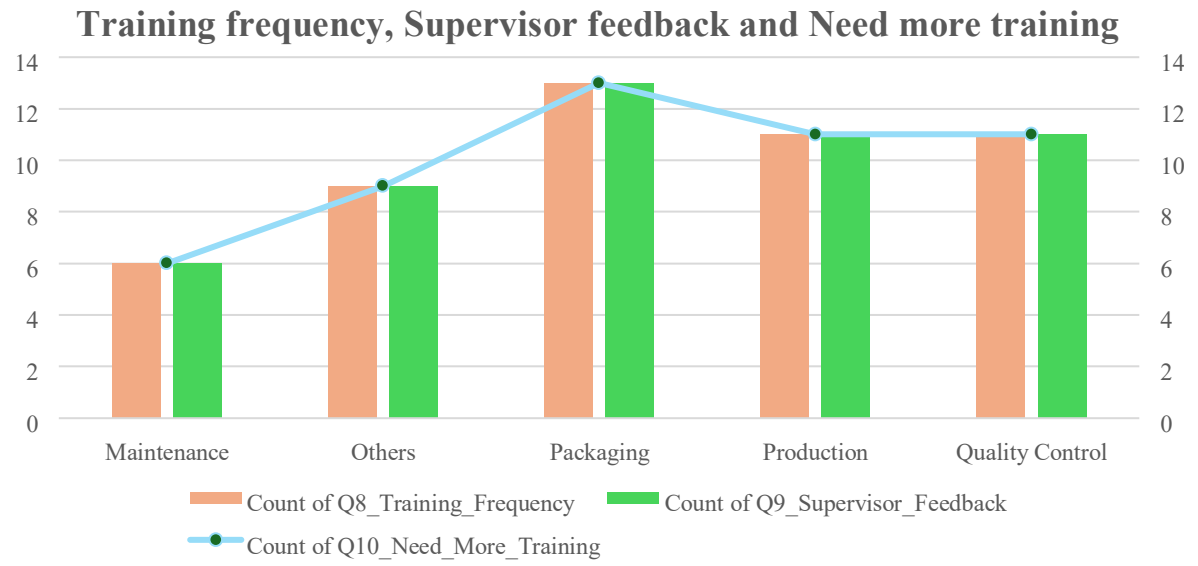

Figure 4 – Training frequency, Supervisor feedback and Need more training (self-made)

According to the chart, the department's 'Training Frequency' (Q8), 'Supervisor Feedback' (Q9) and 'Need More Training' (Q10). Packaging appears on both the most-used and mostvoiced items lists. Additionally, it also shows the highest expressed need for more training. This suggests it is becoming more complex or may be changing. They also have active programs. Production and quality control are of average frequency/ feedback with similar average additional-training needs (Lin et al., 2019). All three have low maintenance, implying

a slightly less-than-optimal training frequency, limited coaching, and a relatively low demand signal that may disguise rather than meet needs. “Others” sits mid-range across measures.

Method effectiveness, Overall satisfaction and Interested in extra training

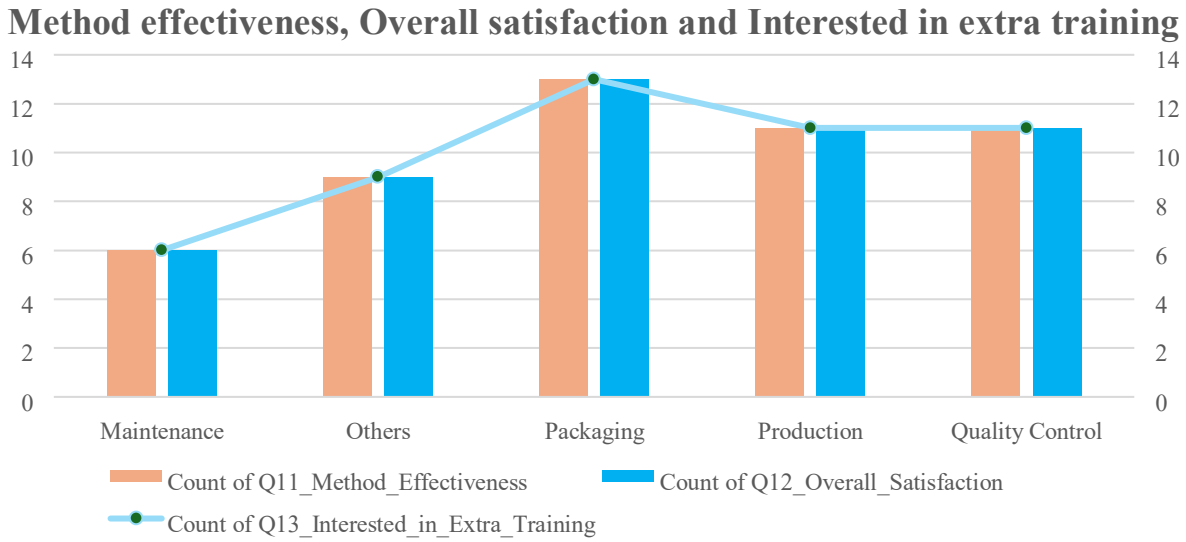

Figure 5 – Method effectiveness, Overall satisfaction and Interested in extra training (self-made)

The bar chart shows departments on training method effectiveness (Q11), overall satisfaction (Q12), and interest in extra training (Q13). Packaging demonstrates the highest scores for the effectiveness of the method and satisfaction. It also shows the strongest interest in further training. This indicates an engaged unit seeking further upskilling. The Production and Quality Control department has reported that they are performing efficiently and satisfactorily, with moderate interest in additional training. Perceived impact of the training and enthusiasm for further training are weaker, as indicated by all three measures (Kusiak, 2019). “Others” sits mid-range. In a nutshell, satisfaction stays high while strong appetites or tasting needs for development are also strong.

4.2.2 Statistical findings

Section A: General Information

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Years_of_Service	50	4	1	5	3.18	1.351

Department	50	4	1	5	2.96	1.456
Valid N (listwise)	50					

Table 1 - Descriptive statistics (self-calculated by SPSS)

The descriptive statistics in the SPSS summarize the responses of the 50 respondents on two variables – Years of Service and Department, which are five categories on the same scale as the survey code.

The average respondent in the sample works as a cybersecurity professional in an organization that has been in existence for over 10 years. Such a significant finding highlights the need for understanding the cyber resilience of the organization.

The mean score of the Department is 2.96 (SD = 1.456; range = 1–5) which indicates that the average response is very close to Maintenance department but in practice centers almost equally across Production (1), Quality Control (2) and Maintenance (3), meaning that it is represented well across all three departments and is not dominated by a single unit.

Both variables have quite similar standard deviations, indicating that they have enough heterogeneity that can help in studying the relationship between tenure and functional area with training perception and defect exposure in later analyses (Kumar et al., 2022).

Section B: Training Effectiveness and Production Quality

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Q3_Sufficient_Training	50	3	2	5	3.62	1.086
Q4_Error_Prevention_Training	50	3	2	5	3.46	1.147
Q5_Apply_Skills	50	3	2	5	3.40	1.178
Q6_Quality_Standards	50	3	2	5	3.88	1.081
Q7_Defect_Reduction	50	3	2	5	3.80	1.195

Q8_Training_Frequency	50	3	2	5	3.54	1.129
Q9_Supervisor_Feedback	50	3	2	5	3.48	1.282
Q10_Need_More_Training	50	3	2	5	3.50	1.074
Q11_Method_Effectiveness	50	3	2	5	3.66	1.062
Q12_Overall_Satisfaction	50	3	2	5	3.36	1.139
Valid N (listwise)	50					

Table 2 - Descriptive statistics (self-calculated by SPSS)

The descriptive results in SPSS for 50 respondents show a generally positive but moderate perception of training effectiveness and quality impact. The mean ratings of each factor range from 3.36 to 3.88 on the 5-point scale (Kumar and Rodrigues, 2020). Their standard deviations are found to be 1.06–1.28. In other words, it can be said that the mean responses of respondents are centrally clustered around the agree category, but there exists a lot of variation in their experiences.

The aspect which scored highest amongst the responses is perceived understanding of the quality standards (Q6 mean=3.88, SD=1.081). This implies that training is relatively successful in clarifying the inspection process and expectations of compliance. The effectiveness of methods is rated quite high (Q11 mean = 3.66, SD = 1.062). In other words, on-the-job, workshops, and mentoring are seen as valuable quality improvement modalities when delivered consistently. Views that there is enough training being provided (Q3 mean = 3.62, SD = 1.086) and adequate frequency (Q8 mean = 3.54, SD = 1.129), leave headroom, as qualitative data suggests there could be a stronger frequency of refreshers.

The overall results in table (0.5) point to some areas not being quite as effective as others, such rapport (Q1 mean = 3.74, SD = 0.917) and timely responses (Q2 mean = 3.64, SD = 1.080) with regard to the learning applications, clarity input, and error prevetion content are not too far off center especially newer product variants and equipment. The average score for question 9 concerning supervisor feedback is three point four eight, while the standard deviation is one

point two eight two (Kristensen and Remmen, 2019). The higher dispersion of scores indicates a lack of consistency in coaching and reinforcement across teams or shifts.

The reduction of defect perception is rated favorably after training (Q7 mean = 3.80, SD 1.195), which self-reports a link between training and quality outcomes. However, the overall satisfaction looks like the lowest means (Q12 = 3.36, SD 1.139) as it is not regarded as a fully satisfactory impact and continuity. People think that additional or updated training could reduce defects even further (Hartini et al., 2020). With a Q10 mean of 3.50 and SD=1.074, this shows a desire for targeted, refresher and role-specific modules for translating understanding into consistent defect-preventing behaviour.

Chapter 5: Conclusion and recommendations

5.1 Conclusions

The research determined that training at K.M. Furniture is there, but it is uneven in pattern, role specificity, reinforcement, and thus limits its impact on defect prevention. The descriptive results indicate that there is moderate agreement that employees receive the necessary training and understand the quality standards. However, the application on the shop floor and the clarity of error prevention guidelines are closer to neutral (Ayala et al., 2017). Together, these results suggest that there may be a transfer gap between what is taught in the training room and what is needed on the shop floor. After the training, people observed fewer defects being present. Also, the pilot improvement in finishing defects indicates a link between the training and the quality gains (Guzel and Shahbazpour Asiabi, 2022). All three years of departmental patterns reflect that Packing, Production and Quality Control have generally reported successful attainment of training objectives. Maintenance, on the contrary, has consistently been unable to apply learnt skills, understanding the quality of the product as well as the reduction of defects. There is a discrepancy in supervisor coaching across shifts, and refresher training is often reactive (De los Rios and Charnley, 2017). Overall, while employees were happy with the training materials, other indicators gave better results. And employees expressed an appetite for more or newer modules. There is strong evidence available indicating which upskilling opportunities can provide a high return. High return activities include role-based upskilling, especially machine setup or calibration and finishing, standardized refresher cycles, stronger

on-the-job coaching, and assessment, which closes the loop from training input to defect reduction (Guerrero et al., 2017).

5.2 Practical Recommendations

- **Implement a role- and process-based training curriculum:** Focus on training competencies related to the top Pareto defects. They are CNC setup and calibration, measurement and inspection, edge banding, sanding discipline, as well as finishing contamination control (Ersöz, Güven and Ersöz, 2022). Make use of standardised job instructions with visual standards, one-point lessons, and station checklists.
- **Institutionalize a quarterly refresher calendar:** Align content with recent defect trends and engineering changes; require brief re-certifications on CTQ steps and gauges.
- **Strengthen supervisor coaching:** Standardize leader standard work for daily observation, quick checks on SOP adherence, and immediate feedback; train supervisors in coaching conversations and basic root-cause tools (5 Whys, Fishbone).
- **Launch targeted Maintenance upskilling:** Focus on preventive maintenance routines, calibration, and rapid restoration to reduce setup variability and drift that drive defects downstream (Ding et al., 2020).
- **Blend delivery methods:** Combine short e-learning primers for concepts with hands-on practice on real jigs, plus peer mentoring for new models; use skill matrices to plan rotations and ensure "right skills at right station."

5.3 Future Research Directions

In future studies, this case can be expanded to various furniture firms to compare their training designs and cultural enablers. Using advanced analytics to link operator skill profiles and training histories to defect probability models, or training event time series analyses to defect time series evaluations, can be more quantitatively causal (Albukhitan, 2020). Finally, A/B tests for the training programs (e.g., Microlearning versus Job Instruction) and longitudinal follow-up studies will clarify which experiments maintain behaviour change and quality improvement.

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Appendix

Survey Questionnaire

1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree

Section A: General Information

1. **How long have you been employed at K.M. Furniture?**

   ☐ Less than 1 year ☐ 1–3 years ☐ 4–6 years ☐ 7–10 years ☐ More than 10 years

2. **Which department do you work in?**

   ☐ Production ☐ Quality Control ☐ Maintenance ☐ Packaging ☐ Others

Section B: Training Effectiveness and Production Quality

3. **The company provides sufficient training related to my job role.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. **The training sessions clearly explain how to avoid production errors or defects.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. **I can apply the skills and knowledge gained from training directly to my daily work.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. **The training programs have improved my understanding of quality standards and inspection procedures.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

7. **After attending training, the number of production defects in my work has decreased.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

8. **Training sessions need to happen enough times to keep skills going.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

9. **Trainers keep track of there students and warn them when they make a mistake.**

   ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

10. **The additional training could reduce the parts defects coming from my shop its just a reduction.**

    ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

11. **The current ways to train people on these sorts of jobs is doing its job perfectly, yet still consistently being improved.**

    ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

12. **I am well pleased that training programs have a positive effect on our finish products.**

    ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section C: Additional Input (Optional)

13. **Would you want to learn how to prevent defects before they happen.**

    ☐ Yes ☐ No ☐ Maybe