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Competence Level, Productivity Differentials and Age-Based Variation in Training Participation: Evidence from Corporate Employees in India

Ravendra Kumar Mishra[1], Dr. Suresh Chandra Padhy[2]

[1]Research Scholar, Department of Management, Poornima University, Jaipur (India)

[2]President (Vice Chancellor), Poornima University, Jaipur (India)

Abstract

This study examines three related questions concerning corporate employees' soft-skill competence, productivity and training participation: whether competence level predicts employee productivity, whether productivity differs significantly across competence groups, and whether training-programme participation differs significantly across employee age groups. Data were collected through a structured, cross-sectional survey of 418 corporate employees across five sectors (Banking, Financial Services and Insurance; Fast-Moving Consumer Goods; Information Technology; Real Estate; and Pharmaceuticals), selected through non-probability convenience sampling. A structural equation model (Maximum Likelihood estimation) showed that competence level has a positive and statistically significant impact on employee productivity (unstandardised estimate = 0.619, $\beta = 0.581$, $z = 9.21$, $p < .001$). Welch's one-way ANOVA showed a highly significant difference in mean productivity across five competence-level groups ($F = 30.7$, $df1 = 4$, $df2 = 74.9$, $p < .001$), with mean productivity rising from 2.85 in the least-competent group to 4.20 in the highly-competent group. A second Welch's ANOVA showed a significant difference in training-programme participation across four age groups ($F = 3.53$, $df1 = 3$, $df2 = 105$, $p = .017$), with employees aged 36-45 years reporting the lowest mean participation. The results suggest that competence is a measurable construct that is relevant to performance and that age is a factor that should be considered when designing a training-engagement strategy, and that the cross-sectional, convenience-sample design should not be interpreted as causal relationships.

Keywords: competence level; employee productivity; age; training participation; Welch's ANOVA; structural equation modelling; corporate employees

1. Introduction

In addition to participation in training, two more questions are important to corporate decision makers: Does the competence attained by employees through training relate to their productivity and is access to and participation in training evenly distributed or clustered in specific groups of people? The Human Capital Theory (Becker, 1993) uses the term competence to refer to the accumulated human capital, i.e. the human capital that an employee has on the job, and should predict how effective the effort is converted into output. However, age and workplace learning studies have consistently suggested that uptake of training is not evenly distributed across the working-age population and will imply for the design and targeting of organisations' development programmes (Picchio, 2021). This paper, which follows the same approach as the three previous ones, attempts to answer three questions with regard to the same 418 employees, 5 sectors, and corporate dataset described in the companion analysis of training participation (Objectives III-V of the parent study): (III) Does employee competence level affect productivity? (IV) Do differences in productivity occur across competence-level groups? and (V) Does training-programme participation vary across employee age groups? The hypotheses are formulated as follows: H3: the level of competence has a positive effect on productivity; H4: there is significant difference between the competence level groups in productivity; and H5: there is a significant difference between the age groups with respect to training participation.

2. Review of Literature

Research on competence-productivity has consistently stated that competence is applied capability, and therefore not a static personal characteristic, and that this applied competence should manifest as measurable differences in performance. Competence had an impact on productivity, and this impact was partially mediated

by job satisfaction and moderated by the technology context of the organisation found by Susanto, Prahiawan and Nupus (2026). This suggests that the competence-productivity link is strong but not necessarily direct. In line with competency mapping, Kethankar (2024) also suggested that competency models are related to employee productivity and that improving competency can increase organizational productivity. On the production system level, Hopp and Van Oyen (2002) pointed out that there can exist significant performance differences between people doing the same job, and that capability differences - aside from role or task differences - are a true source of performance variance in the real world of organisations. All three strands of evidence mentioned above support the direct competence-productivity relationship (H3) and the productivity differences between competence groups (H4) tested in this paper.

In terms of training participation and age, Maurer, Weiss and Barbeite (2003) modelled training participation as a function of individual, situational and motivational factors as well as the age itself, which they later discuss in relation to older workers and technology-mediated work, Charness, Czaja and Sharit (2009). In a review of evidence on training and older workers, Picchio (2021) found that older workers' participation in education and training is generally lower in different countries and that participation continues to be a persistent challenge for organisations. This literature indicates that the observed differences in training participation among the ages are not solely attributable to age but should be considered in the design of training and targeting. This picture is corroborated by recent Indian studies and some cross-national evidence: Budhathoki et al. (2025), study on work-life balance, reported that it was significantly related to stress and performance; whereas Chadha (2024) showed that workplace stress and burnout were related to poor employee wellbeing and organisational performance, indicating that the age-related and competence-related patterns studied here are likely to interact with employees' overall well-being states, a relationship that future research should explore.

3. Research Methodology

The design, sample and instrument are identical to those used in the companion analysis of training participation and are summarised briefly here. The study used a practice-oriented, analytical, cross-sectional survey design (Creswell & Creswell, 2018) administered to 418 corporate employees drawn, through non-probability convenience sampling (Etikan, Musa, & Alkassim, 2016), from five sectors: BFSI (n = 181), FMCG (n = 115), Information Technology (n = 45), Real Estate (n = 46) and Pharmaceuticals (n = 31). Competence Level was measured through twelve Likert-type items (Likert, 1932); Employee Productivity was measured through three sub-dimensions (task, adaptive and contextual productivity); respondents' age was recorded in four bands (below 25, 26-35, 36-45, and above 45 years) for the age-group comparison.

Table 1. Sample Distribution by Age Group (N for Objective V)

Age group	N	Mean participation	SD
Below 25 years	24	4.19	0.396
26-35 years	89	4.05	0.667
36-45 years	111	3.85	0.813
Above 45 years	194	4.09	0.571

H3 was tested using Structural Equation Modelling (Maximum Likelihood estimation, NLMINB optimisation), consistent with the measurement of Competence Level and Productivity as latent constructs with multiple observed indicators. H4 and H5 were each tested using one-way Welch's ANOVA, which is appropriate for comparing means across more than two independent groups (competence-level groups for H4; age groups for H5) and is more robust than the conventional one-way ANOVA when group sizes and variances are unequal, as is the case in both comparisons here. As with the companion analysis, global SEM fit indices, a separate confirmatory factor analysis step and a formal common-method-bias test were not computed at this pre-thesis

stage (Saxena, Bagga, Gupta, & Kaushik, 2024; Ahmad, Alias, Hamat, & Mohamed, 2024), and this is noted as a limitation in Section 7.

4. Results

4.1 Hypothesis 3: Competence Level and Employee Productivity

The structural equation model relating Competence Level to Employee Productivity (N = 418) produced a positive and statistically significant path (Table 2): the unstandardised estimate of 0.619 (SE = 0.0673, 95% CI [0.487, 0.751]) indicates that a one-unit increase in competence level is associated with an approximately equal increase in productivity, and the standardised coefficient (β = 0.581, z = 9.21, p < .001) indicates a moderately strong effect. All twelve observed competence indicators loaded significantly onto the latent Competence Level construct (standardised loadings 0.241-0.842), with Competence6, Competence5, Competence7, Competence9 and Competence11 showing the strongest loadings, and all three productivity indicators again loaded strongly (β = 0.833-0.903). H3 (competence level positively impacts productivity) is therefore supported.

Table 2. SEM Parameter Estimate for H3

Path	Estimate	SE	95% CI	β	z	p
Competence Level -> Productivity	0.619	0.0673	[0.487, 0.751]	0.581	9.21	< .001

4.2 Hypothesis 4: Productivity Across Competence-Level Groups

Welch's one-way ANOVA comparing mean productivity across five competence-level groups (Least Incompetent, Incompetent, Average Competent, Competent, Highly Competent) produced a highly significant result (F = 30.7, df1 = 4, df2 = 74.9, p < .001; Table 3), indicating that at least one group's mean productivity differs substantially from the others. Group descriptive statistics (Table 3) show a clear, monotonic increase in mean productivity with competence: from 2.85 (Least Incompetent, n = 26) to 3.37 (Incompetent, n = 33), 3.55 (Average Competent, n = 26), 4.14 (Competent, n = 217) and 4.20 (Highly Competent, n = 116). Variability (SD) was highest in the smallest, lowest-competence group (SD = 0.94) and lowest in the largest, high-competence group (SD = 0.531), indicating that more competent employees were also more consistent in their productivity. H4 (productivity varies significantly across competence-level groups) is therefore supported.

Table 3. Welch's ANOVA and Group Descriptives for H4 (Productivity by Competence Level)

Competence group	N	Mean productivity	SD	Welch's F (df1, df2)	p
Least Incompetent	26	2.85	0.94		
Incompetent	33	3.37	0.509		
Average Competent	26	3.55	0.79		
Competent	217	4.14	0.531		
Highly Competent	116	4.2	0.549	30.7 (4, 74.9)	< .001

4.3 Hypothesis 5: Training Participation Across Age Groups

Welch's one-way ANOVA comparing mean training-programme participation across four age groups produced a statistically significant result (F = 3.53, df1 = 3, df2 = 105, p = .017; Table 1), indicating that age-group membership is associated with meaningful differences in participation. Descriptively, the below-25-years group reported the highest mean participation (M = 4.19, SD = 0.396), followed by the above-45-years group (M = 4.09, SD = 0.571) and the 26-35-years group (M = 4.05, SD = 0.667); the 36-45-years group reported both the lowest mean participation (M = 3.85) and the greatest variability (SD = 0.813) of the four groups. H5 (training participation varies significantly across age groups) is therefore supported.

5. Discussion

The competency productiveness finding (H3) is in line with the competency research that has been conducted in the field of SEM recently, which reveals that the competency influences the competency productiveness as part of job satisfaction, but not directly as moderated by organisational technology context (Susanto et al., 2026). Even though such mediating/moderating mechanisms cannot be tested directly with the present results, the strength of the direct path ($\beta = 0.581$) supports that competence is not just a descriptive term but is indeed applied capability - the ability to convert effort and knowledge into consistent output.

The large between-group effect for H4 (Welch's $F = 30.7$) and the clear, monotonic increase in mean productivity from the least- to the most-competent group support this interpretation and confirm the production-system evidence that individual capability differences are a legitimate, organisationally observable source of productivity variance even within groups of employees performing similar tasks (Hopp & Van Oyen, 2002). Narrower productivity differentials (lower SD) for highly competent workers also imply that competence development could help to reduce output dispersion, and not just to increase the average output, which is indeed an important difference for workforce planning – more predictable output is as important to operations as higher average output.

This finding that H5 (36-45 years) has a lower rate of participation in training than other age groups is not an obvious linear decline with age, but rather an effect of situational and motivational factors as identified by Maurer et al. (2003) and Charness et al. (2009) - that is, where employee motivation to learn remains constant, the situational and motivational factors of competing role demands (established job responsibilities, supervisory responsibilities, family responsibilities and demands) may reduce discretionary time for training. This broadly aligns with Picchio's (2021) finding that participation in training depends on factors influencing individuals as well as organisations, although the present U-shaped trend (not just a general decline) indicates that the organisational and role-specific factors are at least as important as age itself in this sample.

6. Implications for Practice

This H3-H4 result aligns competency mapping and tiered, competence linked development pathways with human-resource and workforce-planning practice, as it is established that, on the group-level evidence here, the productivity gap between the least- and most-competent groups (2.85 versus 4.20 on the same scale) is large and more closely linked to competence than to other uncontrolled factors. The H5 result supports designing age responsive training engagement (for example, if the 36-45-years band is identified as having an H5 rating, consider if there are any scheduling or workload barriers to participation for this age band, rather than assuming that there is low interest in it) and ongoing monitoring of participation by age band to ensure that no one is structurally under-served by current training scheduling or nomination practices.

7. Limitations and Future Scope

- The cross-sectional, correlational design does not allow for causal interpretation of the competence-productivity relationship (H3); more competent employees could also have other unmeasured characteristics that are more likely to be associated with increased productivity independently of those of the competence.
- The sizes of the competence-level groups in H4 are far from equal (from $n = 26$ to $n = 217$) and no a priori power calculation was conducted for this between group comparison; the smaller groups should be considered indicative only.
- Age was recorded as four broad bands and thus may not capture the age-specific trends in training participation.
- As with the companion analysis, global SEM fit indices, a confirmatory factor analysis step and a formal common-method-bias test have yet to be calculated and are advised prior to thesis submission.
- Future research could examine the barriers to training that exist in each of the situation and specific to the lower participation rates seen in the 36-45 age band, as suggested by Susanto et al. (2026), and include

the competence-productivity relationship in the analysis by either incorporating job satisfaction or testing whether these two relationships are independent.

8. Conclusion

The results of this study indicate that competence level has a positive and significant relationship with employee productivity, there is significant and substantial difference between the competence level groups in terms of productivity, and the participation in training programmes is significantly different between the employee age groups with the 36-45-year band having the lowest participation rate of the four age bands studied. All three hypotheses (H3, H4 and H5) were supported. These results suggest that competence is a quantifiable determinant of productivity variation among corporate workers, and that training-engagement strategy should explicitly consider age-specific uptake patterns, as in the case of training participation, instead of assuming that all workers take advantage of the same training. Again, as with the companion analysis of training uptake, these findings must be interpreted as associations rather than causes, pending the adoption of longitudinal or experimental designs which are recommended for further research.

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