Critical Thinking (Ct) Skills Gap in Data-Driven Decision (Ddd) Making: An Exploration in the Banking, Financial Services, and Insurance (Bfsi) Industry

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Abstract
In the era of AI-supported business operations, the underutilisation of critical thinking by employees poses a significant challenge. By relying on AI systems for decision-making, organisations risk overlooking the invaluable insights and creative problem-solving abilities that critical thinking brings. Harnessing the power of critical thinking in conjunction with AI technologies holds the key to unlocking untapped potential and achieving optimal outcomes in today's complex business landscape. Banking, financial services and insurance companies are leading employers for business graduates. With heavy usage of data in the BFSI companies' departments, graduate employees make data-driven decisions that impact businesses. Hence, decision quality is crucial for graduate employability and business success. Critical thinking for decision-making is proven to be an effective way for quality decisions. Nevertheless, critical thinking usage in data-driven decision-making in banking, financial services and insurance companies remains unexplored. A skill gap analysis shall throw light on the employer expectation vs satisfaction on graduate data-driven decision quality using critical thinking. This research explores the perception/expectation and satisfaction of the Banking, financial services and insurance employers on graduate employees' data-driven decision outcomes, and the critical thinking skill usage by data-driven decision makers is analysed to find out if there is an evident gap in the same. This article highlights the significance of critical thinking and data-driven decision-making in AI-driven businesses. The research indicates that while critical thinking is crucial, it is currently lacking among employees. The findings emphasise the importance of incorporating critical thinking in business studies.

Keywords: Critical Thinking (CT), Decision-Making (DM), Data-Driven Decision (DDD), Data-Driven Decision-Making (DDDM), Banking, Financial Services, and Insurance (BFSI) Industries, Graduate Employees, Business Studies, Skill Gap

INTRODUCTION

Higher education institutions play a crucial role in understanding industry expectations and equipping graduates with the necessary skills for improved performance and employability (Gibbs, Steel, & Kuiper, 2017; Thi Quynh Lan, 2018). Skill gaps, which impede industry growth due to inadequate human skills, are a concern for organizations (Peter Cappelli, 2012; Beach, 2013). Reports suggest that universities are not adequately preparing graduates with the skills demanded by employers (Laud & Johnson, 2013; Chenoy, 2017; Gowsalya & Kumar, 2017; Thi Quynh Lan, 2018). To address this, it is essential to assess skill gaps based on industry expectations, employee performance, and workforce employability (Nair, Patil, & Mertova, 2009; Ibrahim Gamer Eldeen et al., 2018; Manevska et al., 2019; Sharvari, 2019). Graduate employability is now heavily reliant on skills rather than certifications or qualifications (Mcgunagle & Zizka, 2020). Critical thinking (CT) is a widely applicable transferable skill that plays a significant role in decision-making across disciplines and industries (Jackson, 2012; Kerle, 2020). CT involves objectively analyzing and assessing opportunities or issues to make informed judgments (Ennis, 1985; Facione, 2011). Many universities teach CT as a transferrable skill due to its importance in the business industry (Brahler, Quitadamo, & Johnson, 2002; Kahlke & White, 2013; Helyer, 2015; Howlett, Ferreira, & Blomfield, 2016). CT helps business professionals enhance decision quality, avoid assumptions and fallacies, and differentiate human decision-making from machine automation (Kahlke & White, 2013; Whittington, Scholes, & Angwin, 2017). Despite the increasing demand for CT skills, studies indicate that graduates still lack the ability to think critically and make decisions effectively (Tymon & Batistic, 2016; Bahmani, 2016). Data-driven decision-making (DDDM), driven by the growth of data analytics and big data, is becoming essential in the business industry (Bohler, Krishnamoorthy, & Larson, 2017). CT skills are crucial for ensuring decision quality in DDDM (Nielsen & Nielsen, 2020). Given the significance of the banking, insurance, and financial services industry (BFSI), which heavily relies on data-driven decisions, it is crucial to address the skill gap in CT skills for decision-making within this industry (Jackson & Chapman, 2012; Awang & Makhbu, 2015; Cassidy, 2017; Abbasi, Ali, & Bibi, 2018). To bridge this gap and improve graduate employability, it is necessary to understand the expectations of BFSI employers regarding CT skills, the current state of CT skills in data-driven decisions, and potential improvements to the business studies curriculum (Powell, 2018). Conducting skill gap research can help identify weaknesses in the curriculum and enable the development of these essential skills for business graduates (Chenoy, 2017; Gowsalya & Kumar, 2017; Unni, 2017). This research aims to provide a descriptive analysis, mapping the expected CT skill level against its fulfillment in employee data-driven decision-making, to identify gaps and propose measures for improvement (Mbambo, 2009). The research reasons out to be offered as descriptive research(Mbambo, 2009), where objective measurement is more relevant for this research as the CT skill expectation (required/ perceived) mapped against its fulfilment in employee data-driven decision-making.

The research explores the skill gap through a thorough analysis of the following.

- The expectations of the BFSI industry about its graduate employee data-driven decision-making in terms of CT skills usage and decision outcomes
- The usage of CT skills is evident in data-driven decisions and outcomes made by the graduate employees in the BFSI industry
- The evidence of practice-theory CT skill gap in graduate employees' data-driven decision-making alongside the expectations of the BFSI industry

THEORETICAL BACKGROUND

The demand for transferrable soft skills in the business industry is increasing, with at least 57% of senior professionals valuing soft skills more than hard skills (Petrone, 2019). Universities need to focus on providing practical education that emphasizes these skills to prepare graduates for employability and success in the workplace. The deficiency of employability skills among graduates has raised concerns in the business industry (Birrell & Edwards, 2009; Clarke, 2018; Cotronei-Baird, 2013; Eldeen et al., 2018). Problem-solving, logical analysis, teamwork skills, CT skills, and communication are among the crucial employability skills sought by employers (Pazim et al., 2018). Decision-making, which is influenced by education and training, is an outcome of these skills (Tyler and Brunner, 2014). Direct and indirect instructions from managers, policies, procedures, and personal judgment play a role in employee decision-making at the workplace (Böttcher and Meisert, 2013; Zhang et al., 2016). The World Economic Forum ranks CT skills as the second most important skill required by human resources (2017), and employers increasingly seek graduates with CT skills for data-driven decision-making (Graduate Management Admission Council, 2018).

CT skills are crucial in the business industry and have been identified as a skill gap in various fields such as nursing and clinical studies (Kahlke and White, 2013; Monaghan, 2015). However, their application in the Banking, Financial Services, and Insurance (BFSI) industry, which has a high demand for business studies graduates, has not been extensively studied. CT skills are essential for data-driven decision-making in the BFSI industry, which heavily relies on structured thinking (Provost and Fawcett, 2013). Higher education has long aimed to develop CT skills (Ennis, 1985; Facione, 2011; Bryan, 2014; Shakouri, 2016), and their integration into the university curriculum is necessary for workplace efficiency (Keengwe & Byamukama, 2019). Employability skills initiatives that involve employer involvement in course design and delivery have shown positive impacts on graduates' labor market performance (Mason, Williams, and Crammer, 2009). However, there is a gap between the understanding of employability skills by academics and the industry, resulting in limited emphasis on CT skill development in curriculum design (Tymon & Batistic, 2016; Shewakena Tessema, 2017).

To address this problem, this research incorporates concepts from Human Capital Theory (Schultz, 1963; Becker, 1975) to explore the practice of CT skills in the workplace and the knowledge gained from a graduate degree. The Theory of Practice Gap is used to measure the gap between the skills needed at work and those possessed by employees, specifically in the context of CT skills in the BFSI industry (Metilda & PC, 2016; Gowsalya & Kumar, 2017; Abbasi, Ali, and Bibi, 2018b). By analyzing employer expectations and satisfaction with CT skills used for data-driven decision-making, this research aims to identify areas for improvement in the graduate business studies curriculum.

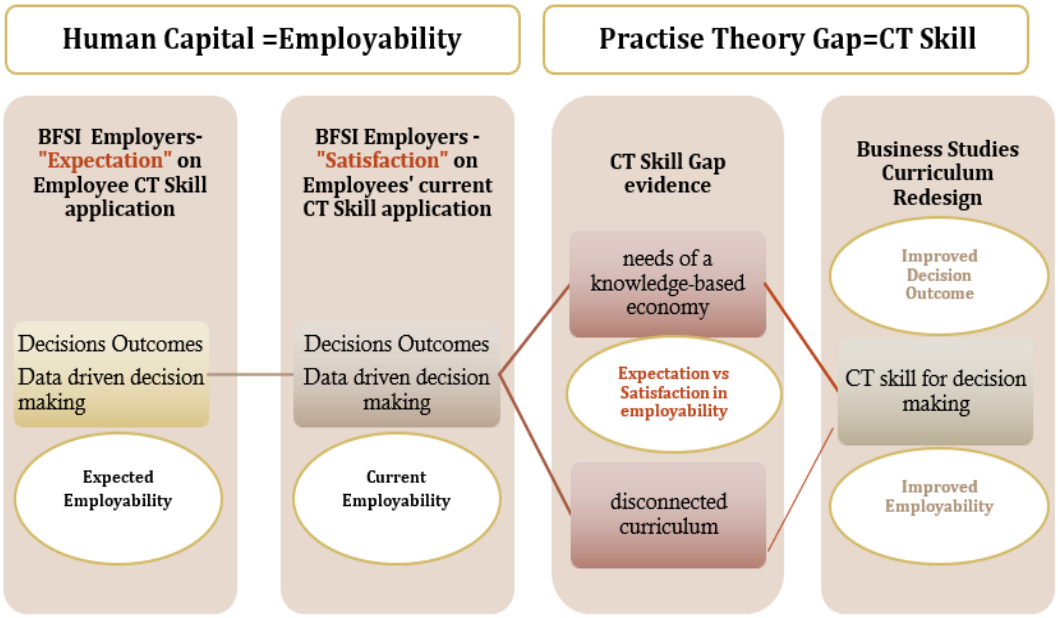

Figure 1: Conceptual framework

As in the conceptual model, the CT skill expectation on the BFSI industry's data-driven decision-making is analysed and mapped against the CT skill delivery by the graduate employees. In terms of **Human Capital Theory**(Schultz, 1963), the worker's employability in his workplace depends on the current skills and knowledge-based economy. Research question 1 measures the expected employability aspect of general decision-making and DDDM (Parvaiz, 2014) to understand the **expected employability** of BFSI graduates. By exploring this research question, the human capital requirement for decision-making in the BFSI industry shall be evolved, and the depth shall be understood by measuring the extent of the skill requirement. Through research question 2, employer satisfaction on CT skills' current usage, to measure employability of the existing graduate employees or **current employability** is done. The Theory Practise Gap measures the CT skill gap in expectation versus current satisfaction. Research question 3, throws light on the gaps in the available knowledge base and evidence of disconnected curriculum based on industry employability expectations. The gap between the knowledge acquired and real-world application can influence professional competency, leading to complexities in advancing from a graduate to a novice professional. Hence, the entire research process's outcome sheds light on redesigning the graduate business studies curriculum for **improved decision outcomes and graduate employability.**

RESEARCH DESIGN

The study focuses on exploring the skill gap, with a realist ontology research philosophy. The researcher maintained an outsider perspective to ensure objectivity, following an etic epistemology. The research adopted a deductive approach using a survey with Likert scale questions supported by open-ended data. The research method was feasible within the time constraints and employed LinkedIn for data collection. Two surveys were used for quantitative and qualitative data collection. The quantitative survey consisted of 33 Likert scale questions exploring employer expectations and satisfaction regarding graduate decision-making and critical thinking (CT) skills in data-driven decision-making (DDDM). The reliability of the instrument was tested using Cronbach Alpha. An open-ended survey was used to collect qualitative data on satisfaction, dissatisfaction, evidence of skill gaps, and

recommendations. Data collection was conducted through an anonymous Qualtrics link sent via LinkedIn, with a response rate of 62%. The sample participants were managers from the banking, finance, and insurance industry, with 106 quantitative survey respondents. The data analysis involved descriptive statistics, nonparametric tests (Friedman test, Kruskal Wallis test, Wilcoxon signed rank test), and thematic analysis for qualitative data. The analysis was conducted using the SPSSTM software package. The statistical procedures aimed to explore expectations, satisfaction, and gaps in decision-making and CT skills. The results were interpreted based on significance levels and effect sizes. The qualitative analysis involved organizing themes, codes, and concepts derived from the open-ended survey responses. The analysis aimed to support and triangulate the quantitative findings. The overall Cronbach alpha stood at 0.928, excluding Qs2 and 0.924 including it. The composite reliability of different variable sections stood between 0.777 to 0.899, and individual factors reliability was between 0.667 and 0.887. The individual items greater than 0.7 are counted to be sufficient, and the Cronbach alpha of all items in this research are above 0.7, which demonstrates that there is a high level of internal reliability/consistency and the questions targeted to capture each variable are at an acceptable level for any analysis.

DATA ANALYSIS

Data analysis has been staged in three parts. The first part explored the BFSI industry **employers' expectations** of their graduate employees' decision-making and data-driven decision-making skills and outcome. The second part explores exploring the **current satisfaction** of the BFSI industry employers with their graduate employees' usage of critical thinking skills in data-driven decision-making. The third part explores the **evidence of the skill gap**.

Part A- Expectations of the BFSI industry employers on its graduate employees' DM and DDDM skills and outcome

The sections below show various aspects of general decision-making, decision outcome, CT skills usage in decision-making and DDDM. This part sets the expectation context based on which later gap analysis in part 3 follows.

The extent of DM and DDDM at the departments in BFSI companies

The extent of decision-making happening at the departments in the BFSI companies is analysed in this section using frequency analysis. The employer's general decision-making and data-driven decision-making, in specific, are analysed in the two sections of the table below. From the employers ' perspective, it outlines the extent and importance of DM and DDDM in the banking, financial and insurance industry.

Position	General DM department frequency						
	Rarely	Some times	NOT FREQUENT	Most of the time	ALWAYS	FREQUENT	Total
Junior Managers	2	0	22.22%	0	7	77.78%	9
Middle Managers	0	6	15.79%	16	16	84.21%	38
Senior Managers	0	2	4.17%	25	21	95.83%	48
Executive managers	0	1	9.09%	3	7	90.91%	11
TOTAL	2	9	10.38%	44	51	89.62%	106
Average			12.33%			87.67%	
Position	DDDM department frequency						
	Rarely	Some times	NOT FREQUENT	Most of the time	ALWAYS	FREQUENT	Total
Junior Managers	0	2	22.22%	2	5	77.78%	9
Middle Managers	0	10	26.32%	16	12	73.68%	38
Senior Manager	0	11	22.92%	20	17	77.08%	48
Executive managers	0	2	18.18%	2	7	81.82%	11
TOTAL	0	25	23.58%	40	41	76.42%	106
Average			22.64%			77.36%	

Table 1: Cross-tabulation (Respondents' managerial positions vs frequency of decision in the department- a. General decision-making (DM) and b. data-driven decision-making (DDDM)

The cross-tabulation analysis reveals that the majority of employers in the BFSI industry frequently engage in decision-making (87.67%) and data-driven decision-making (77.36%). Nearly 9 out of 10 employers make decisions at their workplace, with a high frequency of data-driven decision-making. Only a small percentage of junior managers (less than 2%) reported rarely making decisions. The descriptive analysis indicates that decision-making and data-driven decision-making occur most of the time, with average scores above the midpoint. According to the qualitative survey, employers highlight the significant impact of these decisions on income, cost, and overall business performance in the BFSI industry.

The extent of DM and DDDM by graduate employees at the departments in BFSI companies

The extent of decisions made by the graduate employees in the BFSI companies is analysed using frequency analysis. With the analysis, understanding the extent and importance of graduate DM and DDDM in the banking, financial, and insurance industry are aimed. The analysis of graduate employees' decision-making frequency shall illuminate the research topic's extent and give insights to analyse the upcoming sections.

Position	General DM graduate employee frequency						
	Rarely	NOT FREQUENT	Some times	Most of the time	Always	FREQUENT	Total
Junior Managers	2	22.22%	3	0	4	77.78%	9
Middle Managers	10	26.32%	19	7	2	73.68%	38
Senior Managers	8	16.67%	24	9	7	83.33%	48
Executive managers	1	9.09%	8	1	1	90.91%	11
TOTAL	21	19.81%	54	17	14	80.19%	106
Average			18.82%			81.18%	
Position	DDDM graduate employee frequency						
	Rarely	NOT FREQUENT	Some times	Most of the time	Always	FREQUENT	Total
Junior Managers	1	11.11%	4	0	4	88.89%	9
Middle Managers	9	23.68%	18	8	3	76.32%	38
Senior Manager	7	14.58%	23	10	8	85.42%	48
Executive managers	0	0.00%	9	1	1	100.00%	11
TOTAL	17	16.04%	54	19	16	83.96%	106
Average			13.08%			86.92%	

Table 2: Cross-tabulation(Respondents' managerial positions vs employee frequency of decision in the department- a. General decision-making (DM) and b. data-driven decision-making (DDDM)

The Friedman test showed a significant difference in the extent of graduate decision-making among managers ($\chi 2$ (df:3, n=106) = 171.606, $p < 0.001$). On average, 81.18% of graduate employees frequently make decisions, and 8.7 out of 10 graduates engage in data-driven decision-making. Employers confirmed that graduate employees make impactful decisions related to planning and business outcomes.

Basis of employee decision-making at the workplace

The basis of employee decisions is analysed in this section to give an overview of the support factors that help graduate employees make decisions. By doing this analysis, the value of the skills attained at the university can be understood in terms of their impact on decision-making.

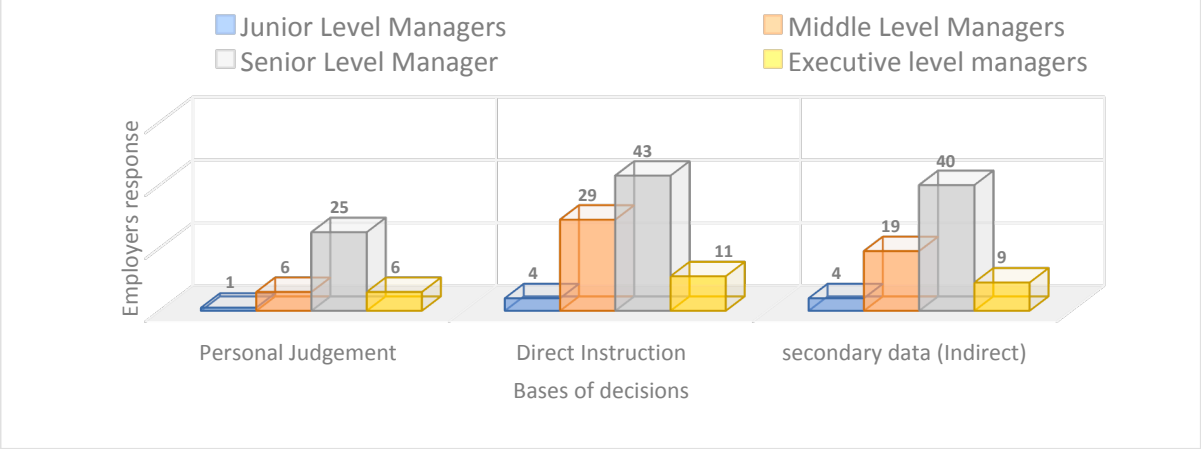

Figure 2: Basis of employee decision-making

The analysis of employee decision-making factors revealed that direct instruction is the primary basis for graduate employees' decisions, with 78.48% of employers agreeing. Additionally, employers identified secondary data (65.50%) and personal judgement (33.88%) as other influential factors. Employers emphasized the importance of direct procedural-level instructions and regular manager guidance in the decision-making process, indicating a level of dependency on managers rather than personal efficiency.

The employer's expectation of graduate employees' CT skill usage on general decision-making at the workplace

The employers' expectation of graduate employees' CT skill usage on decision-making skills is studied under the six CT elements mentioned in the literature review.

Employer Expectations	Mean (M)	Mean Rank (MR)	Std. Deviation (SD)	Range (R)
a. Understanding Purpose	3.54^{H}	3.93	0.588	1-4
b. Setting clear goals	3.34	3.38	0.584	1-4
c. Planning	3.22^{L}	2.99	0.552	2-4
d. Collection of all info	3.52	3.90	0.589	1-4
e. Weighing up alternatives	3.27	3.17	0.578	2-4
f. Identify Risks and Consequences	3.43	3.65	0.586	2-4
Average	3.50	0.58	0.580	

Table 3: Employer expectation of CT steps in employee decision-making(DM)

The Friedman test conducted on the expectations of different critical thinking (CT) skills in decision-making showed a significant difference between the mean ranks of the skills ($\chi 2$ (df:5, n=106) = 54.812, p = 0.001). Understanding the purpose of the decision and collecting all information before decision-making had the highest average means, while planning effort for decision-making had the lowest. Qualitative analysis supported these findings, as participants highlighted the importance of skills such as identifying, reasoning, evaluating options, and evaluating impacts for informed decisions.

The Kruskal Wallis test, comparing the expectations on employee decision-making skills across different managerial levels, showed no significant differences except for weighing up alternatives. Junior managers had different expectations compared to more experienced managers in this particular skill (p = 0.033 for senior managers vs. junior managers, p = 0.011 for middle managers vs. junior managers). It suggests that more experienced managers consider weighing up alternatives before decision-making to be a crucial step in critical thinking, unlike junior managers.

The employer's expectation of graduate employees' CT skills usage on DDDM at the workplace

The employers' expectation of graduate employees' CT skills in data-driven decision-making is studied under various parameters. a.) understanding the purpose of decision-making and setting clear goals, b.) collecting all information available beforehand, c.) usage of adequate

tools for data collection, d.) usage of adequate tools for data analysis, e.) weigh up all alternatives before decision-making.

Employer Expectations	Mean (M)	Mean Rank (MR)	Std. Deviation (SD)	Range (R)
a. Understanding the purpose of decision-making and setting a clear goal	3.46^{H}	3.25	0.538	2-4
b. Collection of all information	3.44	3.25	0.618	1-4
c. Usage of tools for data collection	3.28^{L}	2.80	0.530	2-4
d. Usage of tools for data analysis	3.28^{L}	2.81	0.530	2-4
e. Weighing up alternatives	3.31	2.90	0.575	2-4
Average	3.39	3.50	0.580	

Table 4: The Employer expectation on CT steps in DDDM

The Friedman test revealed a significant difference in the expectations of critical thinking (CT) skills for data-driven decision-making (DDDM) ($\chi 2$ (df:4, n=106) = 22.208, $p < 0.001$). Understanding the purpose of decision-making and setting clear goals, as well as collecting all necessary information, were considered highly important, while the use of tools for data collection and analysis was rated lower. The Kruskal Wallis test showed significant differences in employer expectations based on experience levels, except for understanding the purpose and setting clear goals. More experienced managers had higher expectations compared to junior managers in all other skill areas. Qualitative analysis supported these findings, emphasizing the importance of comprehensive decision-making backed by data and the expectation of CT in day-to-day business decisions.

The employer's expectation of graduate data-driven decision-made (DDDM) outcomes

The expectation of the employers on graduate employees' data-driven decision- outcomes were studied in the below table as a.) probable/predictable outcome, b.) comprehensive decision, c.) unbiased/non-personal judgement, d.) follows structured process e.) timely decisions.

Employer Expectations	Mean (M)	Mean Rank (MR)	Std. Deviation (SD)	Range (R)
a. Probable/Predictable	3.19	3.09	0.664	2-4
b. Comprehensive	3.04^{L}	2.75	0.716	1-4
c. Unbiased/Non-personal	3.11	2.87	0.734	2-4
d. Follow structured process	3.18	3.01	0.644	2-4
e. Timely decision	3.26^{H}	3.28	0.637	2-4
Average	3.16	3.00	0.679	

Table 5: Employer expectation on data-driven decision outcomes

The Friedman test revealed a significant difference in the expectations of data-driven decision-making (DDDM) outcomes ($\chi 2$ (df:4, n=106) = 19.816, p = 0.001). Timely

decisions and following a structured process were considered highly important, while comprehensive decision outcomes were rated lower. The Kruskal Wallis test showed no significant differences in expectations based on experience levels, except for probable and predictable decision outcomes. Junior managers had lower expectations in this area compared to middle and senior managers. Qualitative analysis supported the importance of comprehensive decision-making backed by data, with an emphasis on reducing errors and delays through systematic and structured approaches. Employers acknowledged the impact of graduate employees' decisions on business operations and performance and provided examples of both successful and unsuccessful decision-making instances.

Part B: BFSI employers' satisfaction with the graduate employee usage of ct skills in data-driven decision-making

After the detailed analysis of employer expectations on graduate employees' general decision-making and data-driven decision-making skills and outcome, the following sections analyse the employer satisfaction with the current CT skills usage amongst their graduate employees.

Employer Satisfaction on graduate employees' current usage of CT skills for DDDM

Employer satisfaction with graduate employees' data-driven decision-making was studied under various CT parameters, as in the below table. a.) understanding the purpose of decision-making, b.) setting clear goals, c.) collecting all information available beforehand, d.) weighing up all alternatives before decision-making, e.) Use adequate software tools for data collection and analysis f.) Identifying risk and consequences.

Employer Satisfaction	Mean (M)	Mean Rank (MR)	Std. Deviation (SD)	Range (R)
a. Understanding Purpose	2.98^{H}	3.85	0.457	2-4
b. Setting clear goals	2.85	3.46	0.531	2-4
c. Collection of all info	2.82	3.43	0.582	1-4
d. Weighing up all alternatives	2.75	3.22	0.618	1-4
e. Usage of software tools	2.94	3.76	0.549	1-4
f. Identifying Risk and Consequences	2.74^{L}	3.27	0.694	1-4
g. Overall Usage of CT	2.79	3.64	0.643	1-4
Average	2.84	3.52	0.580	

Table 6: Employer satisfaction on graduate employees' current CT skills usage for DDDM

The Friedman test revealed a significant difference in employer satisfaction levels regarding the usage of critical thinking (CT) skills in data-driven decision-making (DDDM) ($\chi 2$ (df:5, n=106) = 36.088, $p < 0.001$). Employers were relatively satisfied with CT skills related to understanding purposes and the usage of tools for data collection and analysis, but less satisfied with weighing alternatives and identifying risks and consequences. Overall, employers rated their satisfaction with CT skills in DDDM below the agreed level. The Kruskal Wallis test showed no significant difference in satisfaction levels among managers, indicating a general dissatisfaction with the current usage of CT skills in employee decision-making. Qualitative analysis revealed that employers perceived the usage of CT skills in DDDM as highly dissatisfactory, attributing decision-making errors to a lack of comprehensiveness and consideration of alternatives.

Employer Satisfaction on current DDDM outcome

The employer satisfaction with graduate employees' CT skill usage on data-driven decision-making is studied under the parameters of a.) Probable/Predictable outcome, b.) comprehensive decision, c.) unbiased/non-personal judgement, d.) follows structured process, e.) timely decisions.

Employer Satisfaction	Mean (M)	Mean Rank (MR)	Std. Deviation (SD)	Range (R)
a. Probable/Predictable	2.85^{H}	3.71	0.548	1-4
b. Comprehensive Outcome	2.67	3.30	0.700	1-4
c. Unbiased/Non-personal decisions	2.61^{L}	3.16	0.725	1-4
d. Structured outcome	2.76	3.51	0.610	1-4
e. Timely decisions	2.83	3.68	0.560	1-4
Average	2.74	3.47	0.629	

Table 7: Employer Satisfaction on graduate employees current DDDM outcomes

The Friedman test revealed a significant difference in employer satisfaction levels regarding the outcomes of data-driven decision-making (DDDM) made by graduates ($\chi 2$ (df:5, n=106) = 26.118, $p < 0.001$). Employers expressed comparative satisfaction with probable and predictable outcomes, as well as timely decisions, but were dissatisfied with comprehensive outcomes and unbiased/non-personal decisions, which scored below 3 on average. The high standard deviations (±0.700 and ±0.725) suggest that data for comprehensive outcomes and unbiased decisions may fall as low as M=1.97 and M=1.885, respectively, indicating high employer dissatisfaction. Overall, employer satisfaction with the current DDDM outcomes of graduate employees was relatively low, with an average rating of M=2.74 on a scale of 1-4. The Kruskal Wallis test indicated no significant difference in satisfaction levels among managers, suggesting a general lack of satisfaction with the current outcomes of employee decision-making.

Part C: Evidence of graduate employees' CT skill gap

Based on the analysis of expectations **(Part A)** and satisfaction **(Part B)** on employee CT skills on decision-making and decision outcome in the above sections, this section analyses the skill gap in terms of outcome and skill using Zscore and effect size r.

Employer expectation vs Satisfaction gap on employee DDDM outcome

Based on the previous analysis of expectation and satisfaction on DDDM outcome, this section analyses the extent of the decision outcome gap using correlation.

Expectation vs Satisfaction	DDDM Outcome Expectation Means (Mexp)	DDDM Outcome Satisfaction Means (MStf)	Z score	Effect size r
a. Probable/Predictable	3.19	2.85	-4.727	-0.459[L]
b. Comprehensive	3.04	2.67	-4.738	-0.460
c. Unbiased / Non-personal	3.11	2.61	-5.772	-0.561[H]
d. Follow a structured process	3.18	2.76	-5.311	-0.516
e. Timely decision	3.26	2.83	-5.413	-0.526
Average	3.16	2.74	-5.192	-0.504

Table 8: Decision outcome gap of graduate employees based on employer expectation and satisfaction.

The table provided indicates that the average expectations for data-driven decision-making (DDDM) outcomes were above 3 (M=3.16), while the average satisfaction with these outcomes was below 3 (M=2.74). The Wilcoxon test revealed a significant effect in all five pairs of DDDM outcomes (expectation and satisfaction), with a p-value of 0.000. The effect size analysis (r) showed that the widest outcome gap was observed for fair DDM outcomes, while three desired outcomes (unbiased, structured, and timely decisions) exhibited a large effect size (>0.5). Qualitative data supported these findings, with employers citing instances where decisions went wrong and had negative impacts, indicating a noticeable gap in DDDM outcomes.

CT Skill Gap analysis on the employee DDDM at the workplace

Based on the analysis of expectations and satisfaction on DDDM outcome in the above section, the below sections analyse the CT skill gap on DDDM at the workplace.

Expectation vs Satisfaction	Skill Expectation Means (Mexp)	Skill Satisfaction Means (MStf)	Z score	Effect size r
A. Understanding the purpose	3.46	2.98	-6.527	-0.634
B. Setting a clear goal	3.46	2.85	-7.087	-0.688[H]
C. Collection of all information	3.44	2.82	-6.753	-0.656
D. Usage of tools for data collection	3.28	2.94	-4.612	-0.448[L]
E. Usage of tools for data analysis	3.28	2.94	-4.710	-0.457
E. Weighing up alternatives	3.31	2.75	-6.133	-0.596
F.Identifying Risks and Consequences	3.31	2.74	-5.982	-0.581
Average	3.36	2.86	-5.972	-0.580

Table 9: DDD skill gaps analysis

The above table shows that the average expectations on the CT skill usage on DDDM stood above 3(M=3.36) and satisfaction on the same below 3(M=2.86). The Wilcoxon test performed on all the seven pairs of CT skills on DDDM (expectation and satisfaction) from

a-f showed a significant effect of the group with p=0.000 less than alpha 0.001, z and r value given as in the table. Based on effect size r, the skill gap is the widest for b. setting clear goals and collecting all information compared to the least, using data collection and analysis tools. Out of the seven desired CT skills on DDDM, except 1(usage of tools for data collection) falls under the large effect skill gap with >0.5 effect size r. The CT skill gap on DDDM is evident in the quantitative analysis and is supported by the qualitative data wherein the employers agree that an evident skill gap must be fixed. Employers confirm that lack of employee CT skills imposes pressure on managers to function well as a unit and brings reputation compromises, wastage of time and incompetence for further analysis.

Inputs from the BFSI industry to improve the business studies curriculum to incorporate CT skills to enable better data-driven decision-making.

Based on the qualitative data collected through the open-ended survey, the employers agree that CT should be added as part of the graduate curriculum to improve employability. Both the respondents have given varied but limited suggestions on improving the curriculum. The main argumentation for incorporating CT in decision-making is the recurrence of DDDM in the industry. The employers agree that data-driven decision being the core function, expects employees to know the course of action to avoid delays, wastage of time and inefficiencies. Machine elements of decision-making, which can be software that helps in data collection and analysis to support decision-making, are emphasised along with the transferrable human skills of setting goals, understanding purpose etc. In this regard, one of the respondents suggested that the best practises of business operations like six sigma can help in quality decision-making. The employers also emphasise CT's application to business problems as an area of study in the business studies curriculum.

DISCUSSIONS

Expectations of the BFSI industry on its graduate employee's general decision-making and DDDM skills

A substantial amount of decision-making takes place in the banking and financial domain-based companies, with employers of varying experience levels being involved in decision-making. The decisions made by employees in these industries have an impact not only at the department level but also at the organizational level, aligning with previous research (Hensman and Sadler-Smith, 2011). The analysis indicates that graduate employees in the BFSI industry are expected to participate in decision-making to various extents, with a higher frequency of data-driven decisions being observed due to the industry's reliance on data (Brynjolfsson, Hitt and Kim, 2011). The analysis also reveals that decisions made by employees are primarily based on workplace instructions, highlighting the importance of comprehension and personal judgment in decision-making. Employers emphasize the need for employees to be independent but structured, with better decision outcomes. The analysis demonstrates that employers value cognitive ability and comprehensive decision-making, with the understanding that critical thinking skills contribute to improved decision outcomes. Employers place higher importance on employees' inherent and personal skills rather than relying solely on machine support. Overall, employers expect employees to make accurate and timely decisions following a structured process, with comprehensive outcomes desired.

BFSI employers' satisfaction with the graduate employee usage of CT skills in DDDM

CT skills play a crucial role in enabling employees to make successful decisions that impact business operations and performance. However, the analysis reveals that employers are dissatisfied with the current usage of CT skills for data-driven decision-making in the workplace. There is a notable absence of several CT features, particularly in weighing alternatives and identifying risks and consequences. The dissatisfaction extends to the overall decision-making outcomes, with employers expressing dissatisfaction with non-comprehensive outcomes and biased/personal judgment-based decisions. This dissatisfaction is consistent across managers with different levels of industry experience, indicating a widespread issue in the industry.

Evidence of graduate employees' CT skill gap and employer recommendations to higher education

The analysis reveals a significant gap between employer expectations and satisfaction regarding the usage of CT skills by graduate employees in data-driven decision-making (DDDM) at the workplace. This gap is associated with delays, inefficiencies, and gaps in decision quality. The study highlights the wider gap in CT skill usage compared to the gaps in decision outcomes. Employers expect graduates to possess CT skills such as understanding purpose, setting clear goals, collecting information, utilizing IT tools, weighing alternatives, and identifying risks. It is crucial to address this CT skill gap in graduate studies to enhance decision-making and improve business performance in the banking, financial, and insurance industries.

CONCLUSIONS

The exponential advancement of technology, particularly AI, in business operations will significantly increase the demand for data-driven decisions. This necessitates employees to make high-quality decisions at the workplace, as employers recognize the importance of data-driven decision-making. In the context of the BFSI industry, decision-making abilities enhance the employability of graduate employees and have a significant impact on business performance. Through a detailed analysis, this research reveals a clear gap in CT skills based on practice theory and a gap in DDDM outcomes among current graduate employees in the BFSI sector. Addressing the evident skill gap in critical thinking is crucial to empower employees with CT skills for effective data-driven decision-making in BFSI companies. Refining the graduate business studies curriculum at the higher education level is recommended, with a focus on decision-making skills to improve graduate employability, considering human capital theory. The integration of decision-making as a transferrable skill within various disciplines in the era of AI is suggested to enable students to make better decisions in their employment and enhance their employability. Comprehension, which involves understanding the requirements and scope of decisions, is highlighted as the initial step in decision-making. It is essential for graduate employees to comprehend direct and indirect instruction-based decision-making to avoid delays, errors, and wastage during the decision process. Students should be equipped with techniques, tools, and processes to effectively comprehend information. The findings of this research indicate that CT skills play a vital role in supporting efficient comprehension, understanding, and unbiased judgment in decision-making, complementing technology-based systems such as AI. Promoting CT skills for structured decision-making in the workplace can improve graduate employability and meet employers' expectations. Integrating CT into the business studies curriculum with a

comprehensive understanding of its concepts and practical application is strongly recommended. The training of data-driven decision-making skills should encompass both human and machine elements, including software support. Case and scenario-based applications integrated into various business subjects are suggested as effective learning approaches, encouraging students to make decisions utilizing CT elements. According to Chang, Kao, and Hwang (2020), an RSI (Recognise, Summarise, Inquire) modelled flipped classroom can enhance CT-based problem-solving and decision-making skills, surpassing traditional case-based learning methods. Employers' emphasis on CT's cognitive elements over machine support, such as software tools for data collection and analysis, highlights the importance of cognitive CT elements in enhancing thinking abilities and utilizing machines to improve productivity and efficiency. These cognitive elements, including interpretation, analysis, evaluation, inference, explanation, and self-regulation, can be taught at different levels throughout graduate study years, allowing students to progressively enhance their thinking skills for better decision-making. The development of human capital involves enhancing employees' skills, bridging the practice theory gap, and improving graduate employability (Chang, Kao, & Hwang, 2020). One limitation of the current study is that it solely considered managerial positions and their experience as factors influencing employers' expectations and satisfaction. However, it is important to acknowledge that expectations of employee decision-making skills may differ across departments within the BFSI companies, depending on their specific operational requirements. For instance, call centre or back-office employees may not engage in data-driven decision-making using critical thinking as frequently as employees in other departments. This study did not capture the diversity of departmental needs and operations, which was a constraint. Additionally, within the BFSI industry, the nature of data-driven decision-making varies between financial service companies and insurance companies. This study did not account for this distinction, which is another limitation. Future research can address these limitations by incorporating departmental variations and exploring how the profile and activities of different BFSI companies impact the expectations of critical thinking skills at various levels.

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