

Adoption of Data Analytics Among Manufacturing Industry in Melaka Malaysia

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ABSTRACT- Industries and organisations claim to have integrated data analytics into their operations but have yet to reap the full benefits. The purpose of this research is to investigate the extent of data analytics implementation in the Melaka manufacturing industry and its impact on organisational performance. A survey of Melaka manufacturing companies was conducted. The TDWI Analytics Maturity Model was used to assess the level of maturity of data analytics implementation. The results showed that the majority (65%) of organisations were at The Chasm stage and there was a significant correlation between data analytics adoption and organisational performance.

1. INTRODUCTION

According to a comprehensive mapping study of the literature in the domain of digitization and analytics of manufacturing processes, more than half of the studies said that manufacturing procedures are more efficient when done digitally. Data analytics can be used to monitor processes, detect flaws, and implement changes to improve the company's operation, potentially increasing energy efficiency and productivity (Shang & You, 2019). Despite their importance, data analytics applications are not widely adopted due to a lack of understanding of the critical conditions for their success. According to published literature, there is a lack of research on identifying the factors that influence the success of data analytics adoption. The purpose of this research is to investigate the stage of data analytics adoption in the Melaka manufacturing industry, the important variables that influence successful data analytics adoption, and the impact of data analytics adoption on organisational performance.

2. METHODOLOGY

This study's questionnaire is divided into two parts. The first section contains demographic, socioeconomic, and geographic data. The second section assesses the maturity of data analytics adoption using The Data Warehousing Institute's (TDWI) Analytics Maturity Model. Pre-Adoption, Early Adoption, The Chasm, Corporate Adoption, and Mature/Visionary are the maturity stage classifications. The second part also examines the relationship between the independent variables (organizational readiness (OR), organizational data environment (ODE), top

management support (TMS), and data analytics adoption success) (DAA). The relationship between the DAA and organizational performance (OP) was also investigated in order to justify the use of data analytics. The Cronbach's Alpha method was used to assess the validity and reliability of questionnaires. Pearson Correlation Coefficient (PCC) analysis was used to determine the relationship between the OR, ODE, and TMS and DAA success, as well as the relationship between DAA and OP.

3. RESULTS AND DISCUSSION

3.1 Pilot study

The pilot test includes the contribution of approximately 10 respondents to the survey responses. Table 3.1 shows Cronbach's alpha values in the range 0.577 to 0.826. The analysis indicated that all investigation variables are internally consistent and have an acceptable reliability score, except for compatibility with items that are considered low internal consistency. The item is then removed from the questionnaire.

Table 3.1: Cronbach's Alpha analysis

CONSTRUCTS (INDEPENDENT VARIABLES)	CRONBACH'S ALPHA	MEAN	STANDARD DEVIATION
Organizational Readiness (OR)	0.7899	2.65	0.83
Organizational Data Environment (ODE)	0.7934	3.65	0.72
Top Management Support (TMS)	0.7461	3.48	0.78
Compatibility (C)	0.5773	3.38	0.87
Data Analytics Adoption (DAA)	0.8261	3.53	0.91
Organizational Performance (OP)	0.7544	3.66	0.94

3.2 Demographic Data

Based on survey data, a total of 30 valid responses were collected. Data analysis training was completed by 100% of respondents, and 36.7% have 6-10 years of experience in this field. The majority of respondents (80.0%) are between the ages of 25 and 39. Males and females account for 72% and 28% of all respondents, respectively. indicating that the majority of respondents are men. In terms of education, the majority (83.3%) have a bachelor's degree, which is higher than a diploma or a master's degree.

3.3 Data Analytics Adoption Maturity Level

Based on the survey, most of the companies are in The Chasm stage of the TDWI Maturity model. Fern & Stodder (2014) stated that in the Chasm stage, organizations face many hurdles as they move from early hiring to corporate hiring and seek to extend the value of analytics to more users and departments. Therefore, they often spend a lot of time at this stage. Data from the survey indicated that majority of the respondents responded that their organizations lack of analytics capacity and competent resources. Lacking in those characteristics can affect the organizations in term of making strategic data-relevant decisions (Sia et. al., 2022). To move from the Chasm stage or stage four, companies need to overcome this challenge by providing enough skill set and resources.

3.4 Influence of OR, ODE, and TMS on the success of data analytic adoption DAA.

The summary of Pearson Correlation Coefficient (PCC) analysis is as shown in Table 3.2. The analysis indicated that there is strong correlation between two independent variables (OR and TMS) on DAA with the PCC values of 0.741 and 0.823 respectively. The PCC for ODE and DAA suggest moderate correlation with the PPC value of 0.592. The strength correlation relative with the PCC value can be explained by Figure 3.1.

Table 3.3 PCC values of correlation analysis

	OR	ODE	TMS	DAA	OP
OR	1	0.684	0.645	0.741	0.847
ODE	0.684	1	0.551	0.592	0.590
TMS	0.645	0.551	1	0.823	0.756
DAA	0.741	0.592	0.823	1	0.843
OP	0.847	0.509	0.756	0.843	1

These findings suggested the TMS are the most important variables that influence the success of data analytics adoption, followed by OR and PPC. This finding is aligned with study by Marchena Sekli & De La Vega (2021) who reported that top management support is a fundamental element in ensuring successful adoption of new technologies.

Absolute Magnitude of the Observed Correlation Coefficient	Interpretation
0.00–0.10	Negligible correlation
0.10–0.39	Weak correlation
0.40–0.69	Moderate correlation
0.70–0.89	Strong correlation
0.90–1.00	Very strong correlation

Figure 3.1 Pearson Correlation Coefficient Interpretation (Schober et. al., 2018)

3.4 Correlation between the DAA and the organizational performance (OP)

The correlation between the DAA and the organizational performance (OP) is also shown in Table 3.3. The PCC value of the correlation between those two variables is 0.843, indicating a strong correlation between the data

analytic adoption and the operation performance of organization. Adoption of data analytics practices could enable effective internal and external knowledge management, improving an organization's agility in responding to change, which is a critical component in ensuring optimal business performance (Côte-Real et. al., 2017).

4. CONCLUSIONS

According to the findings of this study, 65% of manufacturing companies in Melaka are at the Chasm stage of data analytic adoption. Top Management Support is the most important variable influencing the success of data analytic adoption (PCC of 0.823), followed by Organizational Readiness (PCC of 0.741) and the Organizational Data Environment (PCC of 0.592). There is also a strong correlation between the use of data analytics and operational performance (PCC of 0.843). This is a compelling reason for manufacturing companies to make a concerted effort to incorporate data analytics into their operations.

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