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# The Theoretical and Analytical Framework of Dynamic Capabilities in IT Flexibility: An Exploratory Study in the Oil Products Distribution Company

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**Abstract**

*Businesses are growing interested in using IT to gain a sustainable competitive advantage in today's rapidly changing business environment. This involves developing dynamic capabilities that enable them to stand out and take the lead in their industry. The current research is focused on evaluating the level of interest among the research sample participants in dynamic capabilities and their dimensions (such as reconfiguration capabilities, sensing capabilities, seizing capabilities, and learning capabilities) and their influence on IT flexibility. The results of the statistics analysis to the hypotheses of influence showed a significant effect of dynamic capabilities at the aggregate level and the dimensions level in information technology's flexibility. This research indicates that the dynamic capabilities and flexibility of information technology and its construction guide organisations to ensure their continuity, survival, and growth and to invest in opportunities and face challenges by focusing on practical cooperation and constructive cognitive participation in completing work and solving problems.*

**Keywords:** *Dynamic Capabilities, Flexibility of Information Technology.*

## Introduction

Modern organisations encounter significant challenges adapting to continuous changes by operating in dynamic environments. Technological advancements, organisational changes, customer needs, and desires shift, and competitive dynamics shape the current business landscape (Maijanen & Virta, 2017; O'Reilly & Tushman, 2013; Al-Qasimi et al., 2024). As a result, these organisations constantly strive to balance continuity and the ability to survive and improve efficiency and effectiveness. This is essential to ensure profitability and the organisation's transformation towards a valid, sustainable, and advanced business model through innovations and the development of its dynamic capabilities at the overall organisational level (Dao et al., 2011; Hanelt et al., 2016; Seidel et al., 2013; Alenzi et al., 2022). The performance differences between firms in the same industry have been controversial in the field of dynamic capabilities, as proposed by the research team of Teece, Pisano, and Shuen in 1997. Developing dynamic capabilities is crucial as integrating them into the company's management processes can help identify and prevent harmful path dependence, avoid pitfalls, and maintain competence building and appropriate organisational changes in market or management development. According to the dynamic capability theory, which posits that their impact on the evolutionary fit of operational capabilities should be evaluated, dynamic capabilities contribute to making IT more effective through the improved flexibility that develops through supporting dynamic capabilities. Firms can achieve gains in competitive performance (Mikalef & Pateli, 2017; Al-Qasimi et al., 2024). In this regard, relying on the importance of leveraging the flexibility of the IT infrastructure and effectively adapting it. This supports the theory of dynamic capabilities as a primary method for creating value from the organisation's perspective. This theory complements the resource-based view and serves as a theoretical and administrative framework for achieving success and excellence in addressing challenges and continuous changes in the external environment (Van de et al., 2018). The current study explores the relationship between dynamic capabilities and the flexibility of information technology in strategically reconfiguring it in response to significant changes in Iraq's oil products distribution sector. The study seeks to identify this relationship to effectively address changing environmental conditions and

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enhance the operational performance of oil product distribution companies for long-term success and excellence in this important sector in Iraq.

## Literature Review

*Dynamic Capabilities*

Dynamic capabilities enable the organisation to develop its standard capabilities and direct partners' capabilities towards achieving high returns (Helfat, 2022). This requires the development and coordination, or the management, of the organisation's resources and partners' resources to address and shape changes in the market or the business environment (Chen et al., 2023; Ahmad et al., 2022). Organisations operating in dynamic business environments constantly face significant challenges to adapt to changing conditions (Bocken & Geradts, 2020). Technological developments, regulatory changes, changes in customer needs and preferences, and competitive movement shape the business landscape and challenge the current competitive status of modern organisations. (Dewi et al., 2023) In such circumstances, companies seek to balance continuity and efficiency—to ensure continued profitability—and exploration and adaptation to achieve new competitive positions (Mikalef & Pateli: 2017). To meet this dual challenge, organisations need to create, expand, and/or modify their resources and competencies purposefully based on the resource-based view and the dynamic capabilities approach (Sahebalzamani et al., 2022). The organisation's dynamic capabilities are essential in addressing the changing business environment conditions (Chirumalla, 2021).

*Dimensions of Dynamic Capabilities*

*Reconfiguration*

The ability of the organisation to organise its asset base, transform resources and processes into new value combinations, and build new capabilities through learning (Jantunen et al., 2018), and reconfiguring operational capabilities and deploying new capabilities to address turbulent environments is the ultimate goal of dynamic capabilities that seek to achieve evolutionary fitness and prevent stagnation. (Pavlou & El Sawy, 2011).

*Sensing*

The organisation's sensing capabilities involve scanning the external environment, interpreting information, and identifying market opportunities (Engelmann, 2023). These capabilities are related to the organisation's efforts to extract value from market opportunities (Dias & Lages, 2021). They are crucial in making decisions about strategic investments and business models and managing value chains and ecosystems (Jantunen et al., 2018).

*Seizing*

Seizing capabilities refers to the capacity to capitalise on market possibilities. This entails identifying valuable opportunities, mobilising resources to seize them, and successfully implementing plans to capitalise on them (Fellenstein & Umaganthan, 2019). Seizing is critical for organisations seeking a competitive advantage in dynamic markets (Al-Hamiri & Khalil,2018).

*Learning*

The concept of learning capabilities involves using marketing information to create new knowledge. Learning capabilities refer to the organisation's ability to enhance operational abilities with contemporary knowledge (Kindström et al., 2013). According to Zahra and George (2002), learning capabilities encompass the capacity to acquire, absorb, transform, and apply knowledge.

*IT Flexibility*

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Flexibility within an organisation refers to the ability to adapt to new or changing requirements, which improves management control over the environment. IT flexibility has lately received attention in IT literature due to its importance in ensuring alignment between IT and business organisations. IT flexibility refers to employing IT resources to rapidly and readily support organisational policies via the IT infrastructure (Jorfi et al., 2011). IT adaptability is critical for quick results and sustaining growth in a changing environment. Inflexible IT can contribute to organisational conservatism and resistance to change, reducing performance (Han et al, 2017)

*Research Model and Hypotheses*

The resource-based view theory informs the link between dynamic capabilities and IT flexibility. According to this hypothesis, organisations that have and employ the essential resources have a better chance of market success and influencing their financial performance. Organisations with high dynamic skills and technical flexibility may constantly evolve and enhance their operations, allowing them to fulfil consumer demands better and improve their financial performance (Van da et al., 2018). Several prior research have suggested a link between dynamic skills and IT flexibility. One such research is (Danesh & Yu, 2015), which investigated the association between dynamic capacities and IT flexibility in startups. The study showed a strong positive relationship between dynamic capabilities and IT flexibility. Another study by Lee et al. (2018) found that organisations with strong dynamic capabilities and flexible use of technology can better adapt to changes in the external environment and better meet customer requirements. A study by Micallef et al. (2016) found that dynamic capabilities can directly impact IT flexibility by enhancing an organisation's ability to adapt to changes and continuously improve its operations. Another study by Micallef and Batelli (2017) suggests that dynamic capabilities can help enhance IT flexibility by improving an organisation and developing an organisational culture that encourages transformation and innovation. It is worth noting that these studies support the hypothesis that dynamic capabilities and IT flexibility can work together to enhance organizational performance and achieve success in the market. Based on the above, the following hypothesis was proposed for testing:

H1: Dynamic capabilities significantly influence IT flexibility.

H2: Reconfiguration significantly influences IT flexibility.

H3 Sensing significantly influences IT flexibility.

H4: Seizing significantly influences IT flexibility.

H4: Learning significantly influences IT flexibility.

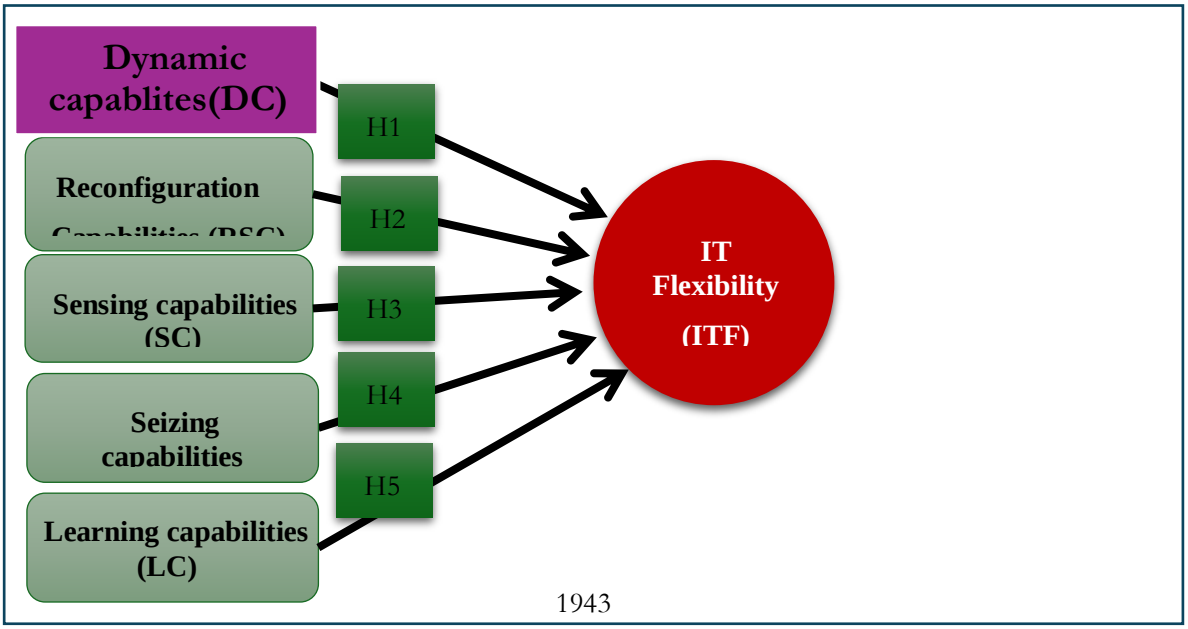

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**Figure 1. A Conceptual Model Depicting the Relationship Between Dynamic Capabilities and IT Flexibility, Along with The Associated Hypotheses**

## Methodology

*Data Collection*

The research questionnaire consisted of 42 paragraphs and was divided into three sections. The first section covered demographic variables, while the second part focused on the independent variable dynamic capabilities and its four dimensions (reconfiguration, sensing, seizing, and learning) based on the scale (Pavlou & ElSawy, 2011; Chukwuemeka & Onuoha, 2018). The third section of the questionnaire included the dependent variable IT flexibility based on the scale (NESS, 2005; Jorfi et al., 2017; Afandi, 2020),

According to the Likert scale ranging from 1 to 5 (ranging from "fully agree" to "strongly disagree"), the research was conducted with fuel station managers employed in an oil products distribution company. The research community consisted of 2215 managers, and the G*Power program was used to determine a total sample size of 327 managers, considering a significance level of 0.05, a statistical power of 0.95, and a medium effect size. The number of questionnaires distributed was 400, and 350 questionnaires were retrieved. Out of these, 334 questionnaires were valid for statistical analysis. The stability and validity of the questionnaire were assessed using the Cronbach's Alpha coefficient. The clear results in Table 1 indicate the Cronbach's Alpha coefficients for the dimensions, revealing the high stability of the questionnaire. The Dynamic capabilities variable and IT flexibility variable values were 0.956 and 0.895, respectively. The coefficients for the different dimensions of the questionnaire ranged between 0.813 and 0.886. This demonstrates that the questionnaire, including all its dimensions, exhibits a high and acceptable degree of stability.

**Table 1. Study Scale with Respect to Survey Sections, Sources, and Cronbach's Alpha**

| Section | variables | source | items | Cranach's alpha |
|---|---|---|---|---|
| 2. section one | Participant & company background information | 1. Researcher developed | 4 | |
| 3. 4. section two 5. | Reconfiguration (RSC) | Pavlou&ElSawy,2011) Chukwuemeka & Onuoha 2018) | 5 | 0.813 |
| | Sensing (SC) | | 5 | 0.886 |
| | Seizing (SZC) | | 5 | 0.868 |
| | Learning (LC) | | 5 | 0.879 |
| | Dynamic capabilities (DC) | | 20 | 0.956 |
| 6. section three | IT flexibility (ITF) | NESS (2005) Jorfi et al. (2017) Afandi (2020) | 18 | 0.895 |

*The Demographic Data*

The demographic information was gleaned from the survey data used in this study, as Table 2 illustrates. The age group between 30 and 40 comprised the most significant share of the sample (37.13%), followed by those between 41 and 50 (27.54%), over 50 (23.35%), and under 30 (11.68%). Those with diplomas represented the biggest group regarding academic credentials, 48.80% of the sample. The bearers of a bachelor's degree (19.16%), a higher diploma (5.69%), a master's degree (0.60%), and a preparation certificate (25.75%) came next. Thirty per cent of participants reported a basic degree of acquaintance with the technology utilized in gasoline distribution operations, fifty per cent reported an intermediate level, and twenty per cent reported an advanced level. 50% of participants had taken part in less than five supply chain training courses or seminars, while 40% had taken part in five or more.

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*Descriptive Analysis*

The study findings indicate that the average ratings for all the variables are higher than the neutral value of 3, which shows that the respondents have positive opinions about the study's variables. In Table 4.1, the average rating for dynamic capabilities is 3.639. The average ratings for its dimensions are as follows: Reconfiguration 3.632, Sensing 3.666, Seizing 3.618, and Learning 3.640. IT flexibility has an average rating of 3.630. Additionally, the standard deviation values for IT flexibility and the dynamic capabilities variable are both greater than 0.60, indicating significant variation in the responses for these research variables.

**Table 4.1 Descriptive Results**

| Measurement Items | Mean | SD |
|---|---|---|
| RSC | 3.632 | 0.722 |
| SC | 3.666 | 0.696 |
| SZC | 3.618 | 0.711 |
| LC | 3.640 | 0.703 |
| DC | 3.639 | 0.664 |
| ITF | 3.630 | 0.656 |

*Structural Equation Modelling (SEM)*

In this study, we utilized structural equation modelling (SEM) as a statistical method to analyse the causal relationship between dependent and independent variables. It employed Smart-PLS 3.0 to assess the measurement and structural models. (Urbach & Ahlemann, 2010)

*Assessment of Reflective Measurement Model*

A measurement model defines the relationship between the latent variable and the indicator or manifest variable. Principal Component Analysis (PCA) assesses the Partial Least Squares (PLS) measurement model. Because the variables in the study were reflective, the measurement model was also evaluated for internal consistency, indicator reliability, convergent validity, and discriminant validity (Mohammad Dalvi et al., 2018).

*Internal Consistency Reliability*

Internal consistency is measured using composite reliability (Amin et al., 2018). More specifically, Hair et al. (2014) state that a composite dependability of 0.70 or above is acceptable. The composite reliability (CR) data are shown in Table 4.7. All of the CR values were found to be more than 0.70. In other words, as the study's findings were consistent with Hair Jr. et al. (2016)'s general recommendations, all of the variables were considered credible.

**Table 4.2 Results of Composite Reliability**

| Variable | | Composite Reliability |
|---|---|---|
| DC | RSC | **0.886** |
| | SC | **0.881** |
| | SZC | **0.887** |
| | LC | **0.885** |
| ITF | CPT | **0.890** |
| | CNT | **0.874** |
| | MOD | **0.890** |

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*Convergent Validity*

Convergent validity is the positive relationship between a measure and further measurements of the same variable. Evaluating reflective variables' validity is crucial (Amin et al., 2018). The assessment of the measurement model, including AVE and factor loadings, is shown in Table 4.3. Hair et al. (2014) suggested that factor loadings of at least 0.70 should ideally be present for all items. The factors showed saturations higher than 0.70, indicating that the factors captured a sufficient amount of variation from the variables. The saturation of the factor explains the variation represented by the variable. Additionally, the Average Variance Extracted (AVE) values for each item were above 0.50, indicating that the variables in the study demonstrated convergent validity.

**Table 4.3 Results of Convergent Validity**

| First-Order Variables | Second-Order Variables | Items | Loadings |
|---|---|---|---|
| **RSC** | DC | RSC 1<- RSC | 0.835 |
| | | RSC 2 <- RSC | 0.829 |
| | | RSC 3 <- RSC | 0.847 |
| | | RSC 4 <- RSC | 0.815 |
| | | RSC 5 <- RSC | 0.817 |
| **SC** | | SC 1<- SC | 0.818 |
| | | SC 2<- SC | 0.843 |
| | | SC 3<- SC | 0.809 |
| | | SC 4<- SC | 0.82 |
| | | SC 5<- SC | 0.829 |
| **SZC** | | SZC1 <- SZC | 0.817 |
| | | SZC2<- SZC | 0.833 |
| | | SZC3 <- SZC | 0.795 |
| | | SZC4 <- SZC | 0.807 |
| | | SZC5 <- SZC | 0.846 |
| **LC** | | LC1 <- LC | 0.813 |
| | | LC2 <- LC | 0.836 |
| | | LC3 <- LC | 0.812 |
| | | LC4 <- LC | 0.829 |
| | | LC5 <- LC | 0.85 |
| **CPT** | **ITF** | CPT1 <- CP | 0.779 |
| | | CPT2 <- CP | 0.778 |
| | | CPT3 <- CP | 0.794 |
| | | CPT4 <- CP | 0.79 |
| | | CPT5 <- CP | 0.832 |
| | | CPT6 <- CP | 0.794 |
| **CNT** | | CNT1<- CNT | 0.809 |
| | | CNT2<- CNT | 0.792 |
| | | CNT3<- CNT | 0.829 |
| | | CNT4<- CNT | 0.788 |
| | | CNT5<- CNT | 0.798 |
| | | CNT6<- CNT | 0.81 |
| **MOD** | | MOD1<- MOD | 0.725 |

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| | | | |
|---|---|---|---|
| | | MOD2<- MOD | 0.801 |
| | | MOD3<- MOD | 0.807 |
| | | MOD4<- MOD | 0.814 |
| | | MOD5<- MOD | 0.804 |
| | | MOD6<- MOD | 0.745 |

*Discriminant Validity*

Evaluating how well items distinguish between different concepts or variables is called discriminant validity (Muslim et al., 2016). According to Hair et al. (2014), a variable that demonstrates discriminant validity is unique and able to capture the phenomenon of interest that is not covered by other variables in the same model. In this study, discriminant validity was assessed using Fornell & Larcker's criteria (refer to Table 4.4).

**Table 4.4 Results of Fornell-Larcker 's Criterion**

| | DC | RSC | SC | SZC | LC | ITF | CPT | CNT | MOD |
|---|---|---|---|---|---|---|---|---|---|
| **DC** | 0.774 | | | | | | | | |
| **RSC** | 0.926 | 0.829 | | | | | | | |
| **SC** | 0.929 | 0.8 | 0.824 | | | | | | |
| **SZC** | 0.95 | 0.847 | 0.842 | 0.82 | | | | | |
| **LC** | 0.947 | 0.83 | 0.846 | 0.875 | 0.828 | | | | |
| **ITF** | 0.978 | 0.895 | 0.922 | 0.94 | 0.911 | 0.746 | | | |
| **CPT** | 0.95 | 0.912 | 0.91 | 0.878 | 0.867 | 0.949 | 0.795 | | |
| **CNT** | 0.93 | 0.842 | 0.868 | 0.931 | 0.848 | 0.946 | 0.861 | 0.805 | |
| **MOD** | 0.872 | 0.763 | 0.819 | 0.836 | 0.853 | 0.922 | 0.81 | 0.799 | 0.783 |

*Assessment of Structural Model*

*Structural Model Path Coefficients*

*Structural Model Path Coefficients (Model 1)*

Hypothesis (H1): Dynamic capabilities significantly affect IT flexibility.

In the model in Figure 4.5, the study used a path analysis model to analyse the direct impact of the Dynamic capabilities (DC) variable Reconfiguration, Sensing, Seizing, and Learning dimensions on IT flexibility (ITF). Table 4.13 and the model in Figure 4.1 indicate a positive effect of the Dynamic capabilities variable on IT flexibility. A coefficient of $\beta=0.978$ and $p<0.01$ suggests that a higher level of dynamic capabilities leads to improved IT flexibility.

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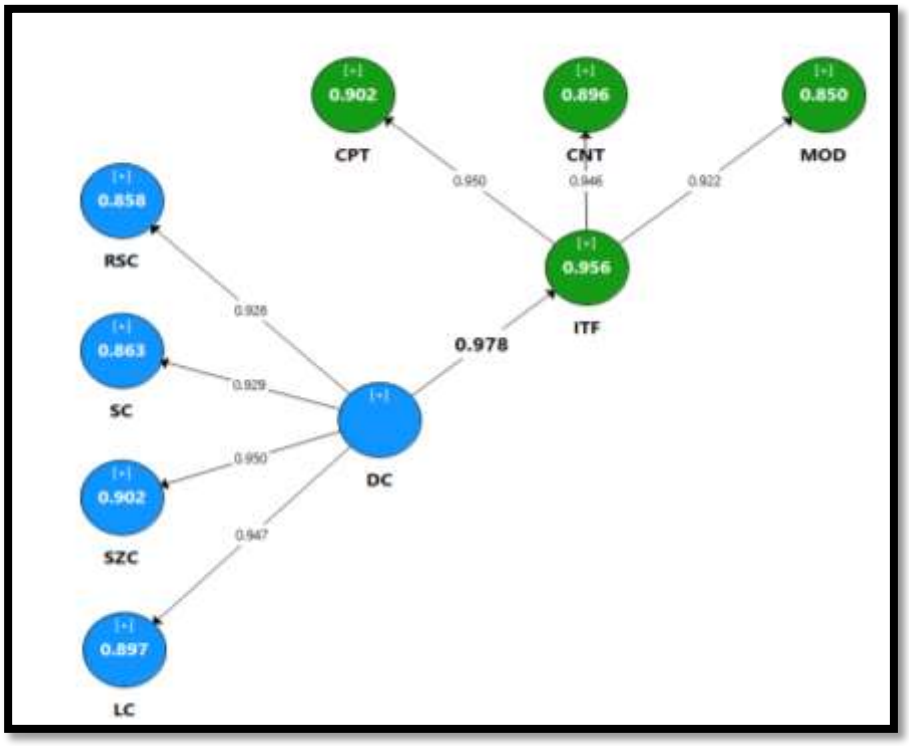


**Figure 4.5 Path Coefficient Model 1 Results for the Effect of Dynamic Capabilities on IT Flexibility**

**Table 4.12 Modeling the Coefficients of the Path Model for the Effect of Dynamic Capabilities on IT Flexibility.**

| Path | Beta | Std.Error | T |
|---|---|---|---|
| DC -> ITF | 0.978 | 0.004 | **135.668** |

*Structural Model Path Coefficients Without Mediating (Model 1)*

Hypothesis (H2): Reconfiguration capabilities significantly affect IT flexibility.

Table 4.12 and the model shown in Figure 4.2 indicate a positive effect of the Reconfiguration capabilities variable (RSC) on IT flexibility (ITF) amounting to $\beta=0.200$, $p<0.01$. In simpler terms, improving a higher level of reconfiguration capabilities leads to improved IT flexibility.

Hypothesis (H3): Sensing capabilities significantly affect IT flexibility.

Table 4.12 and the model shown in Figure 4.2 indicate a positive effect of the sensing capabilities variable (SC) on IT flexibility (ITF) amounting to $\beta=0.336$, $p<0.01$. In other words, a higher level of sensing capabilities would lead to improved IT flexibility.

Hypothesis (H4): Seizing capabilities significantly affect IT flexibility.

Table 4.12 and the model shown in Figure 4.2 indicate a positive effect of the Seizing capabilities variable (SZC) on IT flexibility (ITF) amounting to $\beta=0.361$, $p<0.01$. In other words, a higher level of sensing capabilities would lead to improved IT flexibility.

Hypothesis (H5): Learning capabilities significantly affect IT flexibility.

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Table 4.12 and the model shown in Figure 4.2 indicate a positive effect of the Learning capabilities variable (LC) on IT flexibility (ITF) amounting to $\beta=0.145$, $p<0.01$. In other words, a higher level of sensing capabilities would lead to improved IT flexibility.

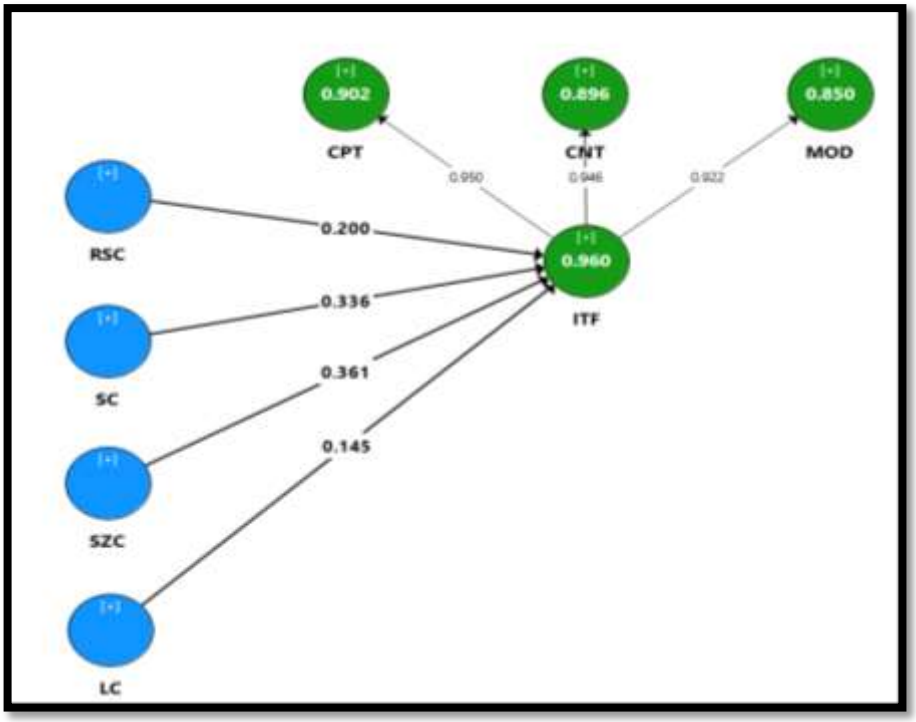


**Figure 4.6 Path Coefficient Model 6 Results for the Effect of Dynamic Capabilities Dimensions on IT Flexibility.**

**Table 4.13 Modeling the Coefficients of the Path Model for the Effect of Dynamic Capabilities Dimensions on IT Flexibility**

| Path | Beta | Std.Error | T |
|---|---|---|---|
| RSC -> ITF | 0.200 | 0.027 | **7.509** |
| SC -> ITF | 0.336 | 0.030 | **11.149** |
| SZC -> ITF | 0.361 | 0.029 | **12.356** |
| LC -> ITF | 0.145 | 0.038 | **3.832** |

*Testing of Hypotheses*

The study's hypotheses were tested using the bootstrapping technique developed by Geisser and Stone. The results of the hypothesis testing conducted for this investigation are displayed in Table 4.7.

**Table 4.18 Results of Hypotheses Testing**

| Research Hypotheses | | Path | T | Std.Error | Result |
|---|---|---|---|---|---|
| **H1** | Dynamic capabilities significantly affect IT flexibility. | 0.978 | 135.668 | 0.004 | Accept |
| **H2** | Reconfiguration capabilities significantly affect IT flexibility. | 0.200 | 7.509 | 0.027 | Accept |

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| | | | | | |
|---|---|---|---|---|---|
| **H3** | Sensing capabilities significantly affect IT flexibility. | 0.336 | 11.149 | 0.030 | Accept |
| **H4** | Seizing capabilities significantly affect IT flexibility. | 0.361 | 12.356 | 0.029 | Accept |
| **H5** | Learning capabilities significantly affect IT flexibility. | 0.145 | 3.832 | 0.038 | Accept |

## Conclusion

The study shows that dynamic capabilities positively impact IT flexibility in the petroleum products industry. Dynamic capabilities help IT adjust to unforeseen events, such as shifts in demand and logistical difficulties. The study found that IT flexibility performance was significantly enhanced at the dimension level by reconfiguration, sensing, seizing, and learning. Reconfiguring the organisation's IT infrastructure helps it adapt to requirements while sensing assists in anticipating technological risks and opportunities. Learning enables the business to consistently acquire information and apply it to enhance its technological systems while seizing, which helps turn identified opportunities into reality by efficiently utilising IT resources. Therefore, investing in developing these dynamic capabilities is crucial to achieving high IT flexibility, which will help the business remain sustainable and improve its capacity to compete and adjust in the intricate and changing landscape of the oil products distribution sector. In conclusion, it is suggested that the business continue strengthening its adaptable skills and use IT as a strategic tool to improve operational performance, increasing productivity and adaptability when dealing with new issues.

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