

Determinants of Academic Research Productivity in Malaysia: An Integration of Theory of Planned Behaviour and Social Capital Theory

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Abstract: Academic research output in Malaysia has been on the rise for decades. However, despite the positives, the key difficulties are the absence of enough funding for research and lower research productivity compared to other countries. Hence, the objective of the study is to examine the determinants of academic research productivity in Malaysia. The combination of the Theory of Planned Behaviour (TPB) and Social Capital Theory (SCT) was applied in this study. 384 academicians' responses were collected using a questionnaire, and PLS-SEM was the main analysis tool. The findings indicated that commitment, leadership, authority, academic integrity, technology, attitude, subjective norm, academic discipline, and knowledge behaviour significantly influence research productivity. However, management support and knowledge intention do not significantly influence research productivity. With this finding, the authors highlighted that TPB-SCT could be combined and extended to become an extended model to measure behaviour and productivity.

Keywords: Academic Research, PLS-SEM, Research productivity

1. Introduction

Research productivity is the utmost important thing for academicians, especially those in scientometric research (Allison, & Long, 1990). It also can increase the citation and publication rate of a particular university (Lindahl, 2023). Hence, research productivity can be an inspiration for individuals to move forward and compete with each other to obtain funding, promotions, and awards. Despite the individual effort, the university and academic environment attributes as well as the national academic systems are also important to encourage the research achievement and performance by that particular university. This support system is vital to sustaining high productivity over time. It also can contribute towards the opportunities to have outstanding performance and extraordinary talent (Kwiek & Roszka, 2023).

Academic research output in Malaysia has been on the rise for decades (Ahsan et al., 2009). Malaysia's government and academic institutions have significantly invested in research infrastructure and financing (Knight & Morshidi, 2011; Mazarol et al., 2003). In turn, the number of publications,

citations, patents, and financing for research in Malaysia has increased in recent years. The quantity of scholarly works is a proxy for how productive a researcher is (Kwiek, 2021). Research output in Malaysia has been on the rise during the past two decades, as seen by the Web of Science database. The report by Elsevier highlighted that the Malaysia research output grown from 18,767 articles and reviews in 2014 to 22,751 in 2018. This indicates the increase trend in publication. However, in 2018, the citation impact was only 6% lower than the global average, while 9.5% of Malaysia's publication belonged to the top 10% most cited globally (Symonds, 2019).

The number of citations received by research articles is another key indicator of academic research productivity (Aksnes et al., 2019). Research papers' citation counts provide evidence of their significance and influence in their domains. The Category Normalized Citation Impact (CNI) score for papers published in Malaysia has also increased gradually, reaching 5.17 in 2020 from 1.56 in 2000. This trend suggests that Malaysian academic journals are gaining clout in their respective sectors. In addition, The number of patents issued is another indicator of the quality of academic research. Research productivity is measured by the number of patents issued for novel ideas (Guerzoni et al., 2017). Throughout the past few years, Malaysia has seen a rising trend in the number of patents it has been able to issue. There were 3,605 patent applications filed in Malaysia in 2020, and 1,664 were ultimately approved, according to data from the World Intellectual Property Organization (WIPO). It indicates a growing trend in Malaysian research towards developing novel products and technologies with marketable potential (Subramanian et al., 2016).

Spending on research is a good indicator of how productive universities are (Dundar & Lewis, 1998). Research funding in Malaysia has been expanding in recent years, with RM7.8 billion (about USD 1.9 billion) set aside for R&D in 2021. It is hoped that with this money, Malaysia's academic research may flourish, and the country can keep making important contributions to the international research community (Singh & Jack, 2018). In addition, the government offers several grants and initiatives to fund research across disciplines. They include the Fundamental Research Grant Scheme (FRGS) and the Exploratory Research Grant Scheme (ERGS).

Despite the positives, certain issues still need to be resolved, notwithstanding the rising productivity of academic research in Malaysia. According to a report by the Malaysian Academy of Sciences, one of the key difficulties is the absence of enough funding for research. Even though the government of Malaysia has been boosting research funding in recent years, the proportion of GDP spent on research in Malaysia is still low compared to countries like Singapore and South Korea. The report also stressed the importance of investing in better research infrastructure and facilities, especially in non-Washington DC colleges and institutes. According to the Ministry of Education's 2018 assessment, just 10% of Malaysian universities had well-equipped research labs. In addition, researchers in Malaysia and everywhere in the world need to work together and share more information to meet this issue. It will be crucial for the future expansion and influence of Malaysia's academic research production to overcome these obstacles.

Hence, the objective of the study is to examine the determinants of academic research productivity in Malaysia. The results and findings contribute to the bigger picture of the root causes of problems associated with academic research productivity in Malaysia. This study applied the theory of planned behaviour (TPB) and social capital theory (SCT) as base theories. The researchers developed the conceptual framework that suits the study by connecting it to the context of academic researchers in Malaysia.

The structure of the paper is as follows. Section 2 explains the past literature and underpinning theories on research productivity. Furthermore, section 3 describes the methodology procedures for data collection and PLS-SEM. In addition, section 4 presents the findings and results. Section 5 discussed the permutations and implications of the results. Finally, section 6 recaps the overall paper.

1.1 Underpinning Theories

Based on these two main ideas in the study of human behaviour, this study seeks to discover the characteristics that contribute to academic research production through Knowledge behaviour. Individual, organisational, and technological factors all play a role in determining the number of variables.

1.2 Theory of Planned Behaviour

Theory of Planned Behaviour (TPB) is one of the most popular and seldom being used in psychological models and research. This model assume that intention is a driver of behaviour. There are three psychological factors that drive the behavioural intention, to be exact are attitude, subjective norms and perceived behavioural control (Wang et al., 2023). It was first proposed by Ajzen (1991) as the theory of reasoned action in the 1980s. According to the notion, an action is predictive of attitude and subjective norm. TPB in 1990 includes the variable perceived behavioural control (PBC) Hale et al. (2002). A person's attitude is their favourable disposition and propensity to engage in such conduct. Subjective norm is the view and expectation of others surrounding a person regarding the execution of behaviour, whereas PBC is the individual's ability and control over behaviour (Godin et al., 1993). Further research on PBC identified two separate influencing elements, namely self-efficacy and controllability. Self-efficacy is an individual's perception of their performance skills, whereas controllability refers to the opportunities to do behaviour based on the availability of resources and conducive conditions (Dwyer, 2019). The TPB also has been employed by Anuar et. al. (2023) to construct an instrument for the Critical Reading Intention Scale (CRIS) to get better understanding on that issue.

1.3 Social Capital Theory

Social capital is a important or very useful reference point or recommendation that could produce a very good achievement and performance (Qiu et al., 2023). Meanwhile, social capital theory (SCT) is a social interaction explanation theory. Social capital has demonstrated its ability to explain individual well-being, society, and groups (Ibrahim, 2006). In conjunction with TPB, SCT has been able to explain the interaction between social variables of persons, such as those between employees and supervisors (Miles et al., 1996). Sniehotta et al. (2014) have determined that the TPB has reached its saturation, even though TPB has been criticised for being an old-fashioned explanation of human behaviour. Understanding an extended TPB would provide sufficient theoretical advancement by providing empirical support for human behaviour. The necessity of extending the TPB as a helpful and relevant theory in diverse fields of practise is supported by numerous experts. It is emphasised once more that no other new theories can replace TPB due to the paucity of supporting evidence and the fact that other new models cannot match the predictive power of TPB across a variety of human behaviours (Conner & Norman, 2015). So, it is adequate to note that this study extended the TPB by incorporating some extra variables based on the human behaviour literature, with academics serving as the primary knowledge behaviour supplier in Higher Learning Institutions.

2. Emphasis and Special Types

According to the study, commitment is an important element that might influence academics' attitudes towards their work and research output. Academically, commitment can be defined as a person's attachment to their work and organisation, including a sense of loyalty and interest in their work. Dedication favours academics' attitudes towards their research output because it generates a sense of purpose and motivation to attain their objectives (Filgona et al., 2020). This finding is corroborated by an additional study by Mohamed and Alsayed (2021) which found that academics who reported higher degrees of dedication were more likely to engage in research activities and create higher-quality research outputs. In addition, Perkmann et al. (2021) discovered that academic dedication was positively associated with research production, as evaluated by the number of published research papers and citations received. Hence, the authors proposed the hypothesis:

H1 = Commitment has positive and significant influence towards the attitude of the academician researchers.

Leadership has been highlighted as a significant component that can influence the attitudes and behaviours of academics about research output. The subjective norms of academics, defined as the perceived societal pressures to engage in research activities and generate high-quality research outputs,

can be influenced by leadership. Transformational leadership, characterised by visionary, inspirational, and supportive behaviours, can positively influence subjective norms among academics by fostering a culture of research excellence and promoting a sense of collective responsibility for research productivity. Juan et al. (2022), Osafo et al. (2021) and Wang et al. (2022) discovered that ethical leadership, which is characterised by fairness, openness, and moral integrity, can positively influence subjective norms among academics by supporting ethical research processes and behaviours. This literature has led us to offer the following hypothesis:

H2 = Leadership has positive and significant influence towards the subjective norms of the academic researchers

It has been established that management support is a critical aspect that might influence the attitudes and behaviours of academics towards academic research productivity. The subjective norms of academics, defined as the perceived societal pressures to engage in research activities and generate high-quality research outputs, can be positively influenced by managerial support. Management support in the form of resources, training, and encouragement can favour academics' subjective perceptions of research productivity (Alturki & Aldraiweesh, 2021; Fauzi et al., 2019). Similarly, it is observed that management support in the form of explicit expectations, feedback, and recognition can positively influence academics' subjective norms on research output (Al-Kurdi et al., 2020; Obrenovic et al., 2022). This literature leads us to offer the following hypothesis:

H3 = Management support has positive and significant influence towards subjective norms of academic researchers

Academics' attitudes and practises towards academic research production can be significantly influenced by authority. Particularly, authority can affect academics' subjective norms, defined as the perceived social constraints to engage in research activities and generate high-quality research results. Authority can positively influence academics' subjective norms regarding research productivity by providing clear guidelines and expectations for research activities, encouraging collaboration and knowledge sharing, and providing incentives and recognition for high-quality research outputs (Qureshi & Afsar, 2021). Similarly, Obrenovic et al. (2022) observed that authority in the form of research funds and grants could positively influence academics' subjective norms by giving the means and support needed to engage in research activities. This has led us to offer the following hypothesis:

H4 = Authority has positive and significant influence towards subjective norms of academic researchers.

Academic integrity has been highlighted as a significant component that can affect the academic discipline of researchers and their research output. Academic integrity can specifically foster a culture of academic excellence, defined as observing ethical and professional norms in performing research activities and creating high-quality research results. Furthermore, academic integrity can favourably impact academic discipline by supporting responsible research conduct, fostering ethical decision-making, and promoting research transparency and accountability (Fudge et al., 2022). Similarly, Susilawati et al. (2022) discovered that academic integrity could positively promote academic discipline among academics by fostering intellectual honesty, critical thinking, and high academic performance standards. This literature leads us to offer the following hypothesis:

H5 = Academic Integrity has positive and significant influence towards academic discipline of academic researchers

Technology has become a fundamental component of academic research output, providing scholars with the tools and platforms necessary to conduct research, collaborate with colleagues, and disseminate research results. Technology can positively influence academic disciplines by giving academics access to a large array of resources, enabling efficient data management, fostering cooperation and information exchange, and supporting interdisciplinary research. Technology can

positively influence academic discipline by providing scholars with the infrastructure and resources necessary to conduct high-quality research, promoting efficient data management and analysis, and facilitating collaboration and knowledge sharing across disciplines (Shamim et al., 2019). Similarly, it is also discovered that technology can positively influence academic discipline among scholars by providing new channels for scholarly communication, fostering interdisciplinary collaboration, and allowing scholars to stay abreast of the most recent research trends and developments (Yu et al., 2022). This literature has led us to offer the following hypothesis:

H6 = Technology has positive and significant influence towards academic discipline of academic researchers.

Within academic research output, attitude is a significant determinant of knowledge intention. The attitudes of academics towards research activities can considerably affect their purpose to engage in knowledge-seeking behaviour and produce high-quality research results. According to the Theory of Planned Behavior (TPB), an individual's attitude is a significant determinant of their intention to engage in a specific behaviour. Scholars' ideas regarding the rewards and costs of conducting research and their perception of the social norms and expectations around research production impact their attitudes towards research activities. Numerous studies have identified a correlation between research productivity attitudes and the knowledge intentions of scholars. It is observed that a positive attitude towards research was positively connected with researchers' intentions to engage in knowledge-seeking behaviour and create high-quality research outputs (Veeravalli & Vijayalakshmi, 2022). On the other hand, attitude strongly influences knowledge aim among management researchers, underscoring the significance of attitude as a predictor of research output (Marcinkowski & Reid, 2019). This literature has led us to offer the following hypothesis:

H7 = Attitude has positive and significant influence towards knowledge intention of academic researchers.

Subjective norm is an additional significant predictor of knowledge aim within the setting of academic research output. Scholars' perceptions of social norms and expectations around research productivity can substantially influence knowledge-seeking behaviour and the production of high-quality research outputs. According to the Theory of Planned Behavior (TPB), the subjective norm is a significant driver of an individual's intention to engage in a specific behaviour. Their social milieu, which includes their colleagues, supervisors, and institutional policies and practices, shapes scholars' perceptions of the social norms and expectations around research output. Numerous studies have identified a favourable correlation between subjective norms and knowledge purpose among researchers regarding research output. For instance, subjective norms strongly increased knowledge purpose among management scholars, underscoring the significance of social influence as a predictor of research output (Joa & Magsamen-Conrad, 2022). In addition, it was also discovered that scholars' perceptions of their colleagues' research support were positively connected with their intentions to engage in knowledge-seeking behaviour and create high-quality research outputs (Wu et al., 2021). This literature has led us to offer the following hypothesis:

H8 = Subjective norms have positive and significant influence towards knowledge intention of academic researchers.

Within the context of academic research output, academic discipline is a significant predictor of knowledge intention. Scholars' academic background, competence, and research interests can substantially impact their intentions to engage in knowledge-seeking behaviour and create high-quality research outputs. Strong academic discipline motivates scholars to seek information and engage in rigorous research procedures that enhance knowledge in their respective domains. Several studies have demonstrated a favourable correlation between academic discipline and research productivity-oriented knowledge goals among researchers. For example, Blind et al. (2022) discovered that finance researchers with a strong academic speciality were more likely to engage in knowledge-seeking activity and create high-quality research outputs. Similarly, Aprile et al. (2021) and Pramono et al. (2022)

showed that management academics with a strong academic discipline were more likely to engage in research procedures that resulted in high-quality research outputs. This literature has led us to offer the following hypothesis:

H9 = Academic discipline has positive and significant influence towards the knowledge intention of academic researchers.

Regarding academic research output, knowledge intention is crucial to knowledge behaviour. The intention of scholars to seek knowledge and engage in research activities is a crucial determinant of their actual behaviour and research outputs. Scholars who are highly driven to acquire knowledge and generate high-quality research outputs are more likely to participate in research activities that develop and distribute knowledge (Al Shraah et al., 2022; Pramono et al., 2021). Several studies have identified a favourable correlation between knowledge intention and knowledge behaviour among scholars regarding research output. For example, it has been discovered that researchers with a greater knowledge aim were more likely to engage in information-sharing activity and create high-quality research results (Stvilia et al., 2018). Similarly, Jull et al. (2017) discovered that scholars with a stronger knowledge purpose were more likely to engage in research activities and create more meaningful research outputs. This literature has led us to offer the following hypothesis:

H10 = Knowledge intention has significant influence towards knowledge behaviour of academic researchers.

Academic discipline has a crucial function in moulding scholars' knowledge behaviour within academic research production. A strong academic discipline is typically associated with increased knowledge-seeking practices, such as attending academic conferences, reading academic journals, and conducting joint research. In addition, they are more likely to produce high-quality research outputs and engage in research techniques that contribute to the progress of knowledge in their particular domains. Several studies have identified a favourable correlation between academic discipline and knowledge behaviour among scholars regarding research output. For instance, Thani and Mirkamali (2018) discovered that education scholars with a strong academic speciality were likely to engage in knowledge-seeking behaviours and create high-quality research outputs. Similarly, Gulbrandsen & Thune (2017) discovered that academics with a strong academic discipline in management are more likely to engage in research techniques that result in high-quality research outputs. This literature has led us to offer the following hypothesis:

H11 = Academic discipline has positive and significant influence towards knowledge behaviour of academic researchers.

It has been discovered that scholars' knowledge behaviour, which comprises information-seeking habits and research techniques, substantially affects research output. Higher-quality research outputs are more likely to be produced by scholars who engage in more knowledge-seeking behaviours, such as attending conferences and workshops, reading academic publications, and working with other scholars. Similarly, researchers who engage in more research practises that progress knowledge, such as employing rigorous research procedures and systematically evaluating data, are more likely to create research outputs that are influential and advance knowledge in their respective domains. Several studies have discovered a correlation between scholars' knowledge behaviour and research output. Knowledge-seeking activities were positively associated with research output among information science scholars (Zhang et al., 2021). Ryazanova and Jaskiene (2022) discovered that research practises, such as adopting rigorous research methodologies and systematically evaluating data, were positively associated with business researchers' research productivity. This literature has led us to offer the following hypothesis:

H12 = Knowledge behaviour has positive and significant influence towards research productivity of academic researchers.

3. Instrument Development

The researcher adapted all measurement items for this study by making slight modifications to ensure their suitability. As a result, 12 constructs were established in this conceptual framework, as these constructs were operationally defined based on Table 1. Questionnaires were used as the main instruments, and a total of 58 items were measured using a Likert scale from 1 (strongly disagree) to 7 (strongly agree). Based on the pilot study, several changes were made to the phrasing and overall structure of the instrument.

3.1 Sampling and Data Collection

This study aimed to identify the determinants of academic research productivity in Malaysia. To achieve this objective, academicians were selected as the most appropriate target population. Therefore, non-probability sampling was employed in this study. The purposive sampling method was used to select academicians because this study focuses on research productivity. As a result, 384 academicians were selected in Malaysia as the sample size of this study.

3.2 Data Analysis

The researchers utilised the Partial Least Square-Structural Equation Modelling (PLS-SEM) approach to evaluate the proposed model of the study. PLS-SEM is a statistical methodology that verifies a structural theory using a confirmatory approach (Hair, Risher, et al., 2019). There are two approaches to SEM, including variance-based and covariance-based techniques. PLS is a component-based SEM algorithm widely used in various research fields. PLS is more effective than other SEM techniques in terms of prediction accuracy and can analyse all paths of the model in a single analysis. Therefore, the study used PLS-SEM by employing Smart PLS 4.0 to accomplish the research objectives. Statistical Package for the Social Sciences v.21 was also used in certain sections of the paper.

Table 1. Construct Operational Definition and Source Adaptation

Construct	Operational Definition	No of items	Source adaptation
Commitment	Person's attachment to their work and organisation, including a sense of loyalty and interest in their work	5	(Filgona et al., 2020; Mohamed & Alsayed, 2021; Perkmann et al., 2021)
Leadership	Ability to inspire, guide, and coordinate a team of researchers towards achieving common research goals and objectives	6	(Juan et al., 2022; Osafo et al., 2021; Wang et al., 2022)
Management Support	Provision of resources, encouragement, and assistance by the management of a research institution	3	(Al-Kurdi et al., 2020; Alturki & Aldraiweesh, 2021; Fauzi et al., 2019; Obrenovic et al., 2022)
Authority	Power or right to make decisions and enforce rules or policies related to research activities.	4	(Obrenovic et al., 2022; Qureshi & Afsar, 2021)
Academic Integrity	Adherence to ethical principles and standards in conducting, reporting, and disseminating research activities.	5	(Fudge et al., 2022; Susilawati et al., 2022)
Technology	Tools, equipment, and systems that are used to enhance and facilitate research activities	6	(Shamim et al., 2019; Yu et al., 2022)
Attitude	Person's underlying disposition or mindset towards research activities	4	(Marcinkowski & Reid, 2019; Veeravalli & Vijayalakshmi, 2022)

Construct	Operational Definition	No of items	Source adaptation
Subjective Norm	the perceived social pressure that the researcher perceives from peers, supervisors, mentors, or collaborators) to engage in research-related behaviours or activities	3	(Joa & Magsamen-Conrad, 2022; Wu et al., 2021)
Academic Discipline	Specific area of study or field of research that the academician is trained in and specializes in	4	(Aprile et al., 2021; Blind et al., 2022)
Knowledge Intention	individual's willingness and motivation to acquire, apply, and disseminate knowledge related to their research area	4	(Al Shraah et al., 2022; Jull et al., 2017; Stvilia et al., 2018)
Knowledge Behaviour	Observable actions and activities that individuals engage in to acquire, apply, and disseminate knowledge related to their research area	4	(Gulbrandsen & Thune, 2017; Thani & Mirkamali, 2018)
Research Productivity	quantity and quality of research output produced by an individual or a group within a specified period	10	(Ryazanova & Jaskiene, 2022; Zhang et al., 2021)

4. Results

The data provided as per Table 2 indicates the distribution of responders depending on several factors, including gender, faculty, years of service, and position. Regarding the gender of the respondents, the vast majority were females. It accounted for 53.54% of the total, while male respondents accounted for 46.46% of the total. This conclusion may suggest that females are more interested in participating in studies or are more likely to work in disciplines connected to the study. On the other hand, however, it may imply that females are more likely to work in fields unrelated to the study.

In terms of faculties, the Faculty of Social Sciences had the most contributors overall. It contains 37.53 per cent of the total respondents from that department. The Faculty of Economics, the Faculty of Mathematics and Sciences, and the Faculty of Languages and Arts were some other faculties with a substantial number of students participating. The findings may imply that the Faculty of Social Sciences employs a significantly larger number of people than employees in other faculties.

In terms of years of service, the biggest proportion of respondents, accounting for 22.57% of the total, had between 11 and 15 years of service. Those who had served over 25 years comprised 19.42% of the population. On the other hand, those who had served for less than five years made up 22.31% of the overall population. These statistics can suggest that the organisation has a workforce that is pretty consistent and that there is a low rate of personnel turnover. In addition, it seems to imply that individuals who have worked for an organisation for more than ten years may have a greater sense of investment in the company and, as a result, be more ready to participate in research.

In conclusion, the findings showed that most respondents held the job of lecturer, which accounted for 49.34% of the total, followed by the senior lecturer, which held 19.69% of the positions, and the instructor, which held 16.01% of the positions. However, it is essential to consider that only a small percentage of respondents were employed in roles similar to those of assistant professors or in other positions such as researchers or laboratory technicians. This finding suggests that the organisation may have more entry-level positions than senior-level positions or that these employees were more willing to participate in the study. Alternatively, this finding suggests that the organisation may have more entry-level than senior-level positions.

In summary, the data offer extremely helpful insights about the demographics as well as the workforce of the firm that was investigated. The findings can assist the company in gaining a deeper understanding of the characteristics of its workforce and the elements that may play a role in determining the extent to which individuals are eager to participate in research. These realisations have

the potential to inform future studies and provide a foundation for the efficient decision-making of organisations.

4.1 Measurement Models

After the two-stage reporting for PLS-SEM, the first stage of the analysis is performed on a measurement model. The measurement model includes both convergent and discriminant validity, which helps the authors determine the validity and reliability of their findings more accurately. The concept of convergent validity refers to ensuring that each item in the model is designed to assess the appropriate construct. In contrast, discriminant validity refers to ensuring that a construct or variable is only grouped with the items pertaining to it. Hair et al. (2019) indicate convergent validity evaluates the cross-loading of each item, the composite reliability, and the average variance extracted (AVE) from the construct. The result demonstrated that all loading items have at least met the threshold value of 0.7. Furthermore, regarding the AVE and the composite reliability, the overall structure achieved threshold values of 0.5 and 0.7, respectively.

Table 3 demonstrates the study's ability to discriminate between groups. To achieve the criteria for discriminant validity, it needs to be higher than every relevant inter-construct correlation. This result demonstrates that the construct in the model is distinguishing other variables because that other item does not load on the other construct (Hair et al., 2019; Sarstedt et al., 2019)

Table 2. Descriptive Statistics

Measure	Items	Frequency	(%)
Gender	Male	177	46.46%
	Female	204	53.54%
Faculty	Faculty of Social Sciences	143	37.53%
	Arts and Humanities	5	1.31%
	Faculty of Economics	55	14.44%
	Faculty of Education	33	8.66%
	Faculty of Engineering	21	5.51%
	Faculty of Language and Art	29	7.61%
	Faculty of Law	12	3.15%
	Faculty of Math and Sciences	44	11.55%
	Faculty of Sports Sciences	23	6.04%
	Science and Technology	16	4.20%
Years of Services	0 – 5 years	85	22.31%
	6 – 10 years	69	18.11%
	11 – 15 years	86	22.57%
	16 – 20 years	39	10.24%
	21 – 25 years	28	7.35%
	More than 25 years	74	19.42%
Position	Lecturer	188	49.34%
	Senior Lecturer	75	19.69%
	Tutor	61	16.01%
	Associate Professor	22	5.77%
	Professor	25	6.56%
	Assistant Professor	5	1.31%
	Others	5	1.31%

Henseler et al. (2015) came out with a novel criterion for evaluating the discriminant components by applying the heterotrait-monotrait (HTMT) ratio correlation in an additional type of extended discriminant analysis. The value of HTMT must be lower than 0.85 when the threshold is set.

HTMT value of 0.9 is yet another more stringent criterion (Franke & Sarstedt, 2019). For HTMT to be considered genuine in terms of the ability to discriminate between constructs, its score must be lower than those values. Table 4 presents the HTMT ratio correlation for reference.

4.2 Structural Model

In the second step of PLS-SEM, the structural model is evaluated. Path coefficient and coefficient of determination are two crucial elements that authors must consider when constructing a structural model (R²). The values that must be considered in the path coefficient are the algebraic sign (either positive or negative), the significance of the coefficient, and the significance of the path (t-values must be greater than 1.69 for two-tailed analysis). The result of the structural model (Figure 1) indicates that the majority of the paths connecting variables are significant, except for H3 (management support does not significantly influence subjective norm) and H10 (knowledge intention does not significantly influence knowledge behaviour). Table 5 displays the results of evaluating all 12 hypotheses in this study.

Table 3. Discriminant Validity

	ACD	ACI	ATT	AUTH	COMM	KB	KI	LEAD	MS	RP	SN	TECH
ACD	0.693											
ACI	0.845	0.724										
ATT	0.705	0.655	0.743									
AUTH	0.750	0.731	0.685	0.682								
COMM	0.787	0.714	0.789	0.692	0.655							
KB	0.247	0.244	0.226	0.199	0.244	0.733						
KI	0.744	0.674	0.775	0.710	0.740	0.149	0.642					
LEAD	0.743	0.738	0.654	0.788	0.671	0.227	0.642	0.659				
MS	0.347	0.398	0.259	0.245	0.228	0.212	0.196	0.364	0.775			
RP	0.512	0.495	0.493	0.380	0.595	0.326	0.402	0.422	0.365	0.688		
SN	0.720	0.702	0.668	0.717	0.732	0.191	0.702	0.768	0.342	0.498	0.642	
TECH	0.745	0.730	0.565	0.652	0.666	0.236	0.558	0.675	0.509	0.498	0.672	0.666

*Sources: Fornell and Larcker (1981)

*ACD – Academic Discipline, ACI – Academic Integrity, ATT – Attitude, AUTH – Authority, COMM – Commitment, KB – Knowledge Behaviour, KI – Knowledge Intention, LEAD – Leadership, MS – Management Support, RP – Research Productivity, SN – Subjective Norm, TECH – Technology

Table 4. Discriminant Validity (HTMT)

	ACD	ACI	ATT	AUTH	COMM	KB	KI	LEAD	MS	RP	SN	TECH
ACD												
ACI	0.178											
ATT	0.697	0.621										
AUTH	0.104	0.808	0.617									
COMM	0.872	0.787	0.861	0.793								
KB	0.401	0.320	0.461	0.360	0.389							
KI	0.190	0.895	0.837	0.872	0.874	0.374						
LEAD	0.307	0.830	0.557	0.843	0.721	0.334	0.818					
MS	0.673	0.614	0.464	0.577	0.410	0.312	0.457	0.696				
RP	0.852	0.784	0.854	0.828	0.820	0.401	0.813	0.783	0.462			
SN	0.818	0.833	0.643	0.843	0.896	0.359	0.891	0.812	0.791	0.821		
TECH	0.807	0.895	0.525	0.829	0.794	0.316	0.763	0.887	0.773	0.747	0.840	

*Acceptable HTMT is below 0.90

5. Discussion

This study revealed that most relationships are meaningful, except for management support and knowledge intention. The following discusses the correlation between each construct and its hypothesis.

5.1 Commitment

Commitment is an important factor that affects attitude, especially regarding how productive research is. Research takes a lot of time and is hard to do. It takes a lot of hard work, dedication, and

persistence. So, a researcher's commitment level greatly affects how they feel about research productivity. When a researcher is dedicated to their work, they are more likely to have a good outlook on how productive they are. This positive attitude can make you more motivated, focused, and productive. It can also make you more willing to take on hard tasks and keep going through hard times. A dedicated researcher is also more likely to take the initiative to look for new research opportunities and work with other researchers, both of which can help them be even more productive.

On the other hand, a researcher who isn't committed might not think research productivity is important. This bad attitude can show up as a lack of motivation, putting off hard tasks, and a tendency to avoid them. A lack of commitment can also make researchers feel less responsible, which makes it easier for them to ignore their responsibilities and miss deadlines. Hence, commitment has a big effect on attitude regarding research productivity. A committed researcher is more likely to have a good attitude about their work, which leads to more productivity and success. On the other hand, a researcher who isn't committed may find it hard to stay motivated and focused on their work, which is needed for good research.

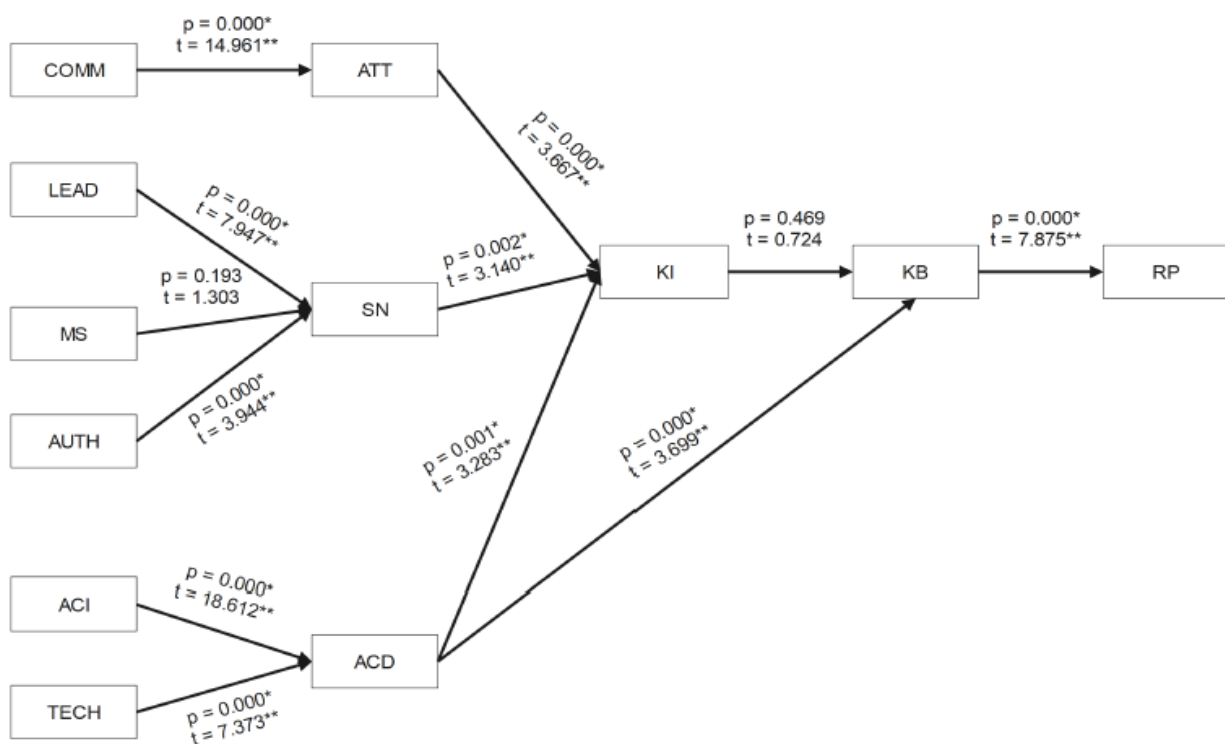


Fig. 1 Result of Structural Model

Table 5. Results of Hypothesis Testing

Hypotheses	B-value	t-value	f ² value	Decision
H1: COMM → ATT	0.789	14.961	0.000	Supported
H2: LEAD → SN	0.496	7.947	0.000	Supported
H3: MS → SN	0.086	1.303	0.193	Not supported
H4: AUTH → SN	0.304	3.944	0.000	Supported
H5: ACI → ACD	0.646	18.612	0.000	Supported
H6: TECH → ACD	0.273	7.373	0.000	Supported
H7: ATT → KI	0.434	3.667	0.000	Supported
H8: SN → KI	0.201	3.140	0.002	Supported
H9: ACD → KI	0.293	3.283	0.001	Supported
H10: KI → KB	(0.078)	0.724	0.469	Not supported
H11: ACD → KB	0.305	3.699	0.000	Supported
H12: KB → RP	0.326	7.875	0.000	Supported

*Support hypothesis when p-value < 0.05 and t-value > 1.9

5.2 Leadership

Research productivity depends on leadership. Subjective norm is how much a person thinks their social network expects them to do something. Leadership can affect research productivity by influencing subjective norms. Leadership that fosters high research productivity standards and accountability might improve team members' subjective norms. Leaders who value research productivity and set high standards for themselves and their teams can foster an environment where research productivity is essential to success. Team members may feel obligated to meet or surpass expectations, raising their subjective norm for research output.

Ineffective leadership might lower subjective norms and research productivity. Leaders who don't value research productivity or establish clear goals for their teams can create an environment that is not seen as important. It can demotivate team members and lower their research productivity and subjective norm. Therefore, Leadership greatly affects subjective norms in research productivity. Good leadership can instil a feeling of duty in team members by setting high standards for research productivity. On the other hand, ineffective leadership might lower subjective norms, team motivation, and accountability.

5.3 Management Support

Management support is how much management helps workers achieve their goals. Management support is essential to an organisation's performance, yet it may not affect research productivity's subjective norm. Subjective norm is how much a person thinks their social network expects them to do something. Peers and supervisors influence research production more than management. Peers and supervisors influence research production more than management. Peers and supervisors can guide, advise, and support team members, improving research productivity. Management assistance, including resources or training, may not directly affect team members' subjective norms.

Management support may be expected rather than extraordinary support for research productivity. Management support may not increase subjective norms but help achieve research requirements. Hence, management support is essential to an organisation's performance, yet it may not affect research productivity's subjective norm. Peer and supervisor assistance influence team members' research productivity.

5.4 Authority

Authority is a person's or group's influence over others. Authority can greatly affect subjective norms or the degree to which an individual believes that others in their social network expect them to behave a certain way, which affects research productivity. For example, supervisors and lead investigators have great influence over their subordinates. Their expectations and actions influence their team members' research output. Authority figures that value research productivity and set high criteria for their teams can foster a culture where research productivity is essential to success. In addition, it can raise team members' research productivity expectations.

Authorities can also encourage research productivity. They might award successful research projects or provide more funding. These steps may boost team members' research productivity norms. Yet, authoritative individuals that don't value research productivity or set clear expectations for their team members can create an environment where research productivity isn't considered important. It may lower team members' research productivity expectations. Overall, authority affects subjective norms in research output. Authority figures who prioritise research productivity and set high criteria for their team members can boost the subjective norm of research productivity, while those who do not can decrease it. Authority figures might encourage research production and reward it for increasing subjective norms.

5.5 Academic Integrity

Academic integrity requires honesty and ethics in study, writing, and publication. Academic integrity affects research productivity by ensuring a consistent and rigorous approach to research. Academic integrity ensures ethical and correct research, preserving research quality and credibility. Academic integrity requires researchers to credit others, report accurate data, and avoid plagiarism and other academic dishonesty. These principles ensure rigour and credibility in research.

Academically dishonest researchers can impair research quality and reputation. Plagiarism, fraud, and data falsification harm research and research results. These actions can also harm researchers and their universities, which can hurt their careers. Therefore, academic integrity greatly impacts research output. Academic integrity ensures ethical and honest research that yields trustworthy results. On the other hand, academic integrity weakens research discipline and lowers research quality and reputation, which can harm researchers and their institutions.

5.6 Technology

Technology has greatly impacted academic research productivity. Technology has improved research methods, instruments, and dissemination. Technology has improved research efficiency and precision. Researchers can quickly and accurately examine big data sets using modern statistical software, data mining tools, and machine learning algorithms. It has helped researchers discover new patterns and linkages.

Technology also helps researchers interact and exchange results regardless of location. Researchers can share data, discuss findings, and collaborate on projects using internet communication tools and platforms, resulting in more meaningful and diverse research results. Technology also helps researchers share their findings through online journals, blogs, and social media. As a result, it has increased the reach and influence of research findings. Hence, technology has improved research productivity by boosting efficiency and accuracy, promoting collaboration and exchange of research results, and enabling greater dissemination of research discoveries. As a result, technology will continue to change research, creating new opportunities and results.

5.7 Attitude

Attitude is a person's general opinion of something. Attitude affects knowledge intention, which is a person's desire to learn about research productivity. Research productivity attitudes can affect a person's willingness to learn about it. Positive attitudes regarding research productivity are likely to view it as crucial to academic or professional achievement, motivating them to learn about it.

Positive researchers are more likely to see the value of research productivity information. In addition, they are likely to understand that research productivity knowledge can improve their skills and competencies in conducting and distributing research results, leading to academic or professional success. Yet, those with a poor opinion of research productivity are less likely to see it as crucial to their academic or professional success, which lowers their incentive to learn about it. Overall, attitude affects knowledge, aim and research productivity. A favourable perspective towards research productivity increases learning motivation, while a negative attitude decreases it. So, promoting a favourable outlook on research production can motivate others to learn about it.

5.8 Subjective Norm

A subjective norm is a person's feeling of societal pressure to behave a certain way. Subjective norm affects knowledge intention, or a person's willingness and drives to learn about research productivity. Social pressure affects a person's willingness to learn about research productivity. For example, those who think their co-workers, supervisors, or mentors appreciate research productivity and valuable knowledge about it are more inclined to value it themselves. Those who believe their social network expects them to engage in research productivity-related activities are more likely to feel obligated to do so, which motivates them to learn about research productivity. Yet, those who believe their social network does not value research productivity or expect them to participate are less likely to

learn about it. Therefore, subjective norms affect research productivity and knowledge intention. In addition, social pressure can affect a person's motivation to learn about research productivity. So, developing a supportive social network that values research productivity and places importance on research productivity knowledge helps motivate and encourage others to learn it.

5.9 Academic Discipline

An academic discipline is a person's field of study or career. Academic discipline affects knowledge, intention, or a person's attitude and incentive to learn about research productivity. Academic discipline can motivate research productivity and knowledge acquisition. Science, engineering, and social science students are likely to understand the value of research productivity and research productivity knowledge.

Research productivity is also crucial for academic and professional success in research-intensive fields. So, they are more likely to learn about research productivity to improve their research and dissemination skills. Yet, those not pursuing a career in a research-intensive profession may not understand the value of research output or its knowledge. Hence, they may be less motivated to learn. Hence, academic discipline affects research output and knowledge intention. Careers in research-intensive fields emphasise research productivity and the value of research productivity knowledge. So, increasing research productivity in academic and professional settings can motivate people to learn about it.

5.10 Knowledge Intention

Knowledge intention is a person's attitude and drive to learn about research productivity, while knowledge behaviour is how they learn and use it. Knowledge aim does not always affect research productivity. Many factors can affect knowledge intention-to-behaviour translation. For instance, people may want to learn about research productivity but lack the time, money, or assistance. Therefore, even if they learn about research productivity, they may not use it at work. If there are no incentives, rewards, or recognition for using knowledge or if there are disincentives or hurdles, this can happen.

Knowledge intention and conduct are complicated and changing. With time, people's intention to gain research productivity-related information may wane, resulting in decreased knowledge behaviour. Hence, knowledge aim does not always affect research productivity. On the other hand, barriers, disincentives, and the dynamic link between intention and behaviour might affect knowledge intention to knowledge behaviour. To improve knowledge intention-to-behaviour conversion, these elements must be identified and addressed.

5.11 Knowledge Behaviour

Knowledge behaviour involves obtaining and using research productivity-related knowledge. Knowledge behaviour greatly affects research output. Research productivity knowledge helps people do and share high-quality research. Knowledge of research methodology, data analysis, and ethics makes researchers more likely to undertake rigorous and ethical research, resulting in better study results.

Research productivity knowledge also improves academic and professional success. For example, those who learn about research productivity are more likely to publish in high-impact journals, get research funding, and progress in their careers. In addition, knowledge behaviour can create a positive feedback loop by using knowledge to learn more. For instance, applying research productivity knowledge may reveal gaps in understanding, resulting in a circle of ongoing learning and improvement. Overall, knowledge behaviour affects research output. Research productivity knowledge contributes to higher-quality research, academic or professional goals, and a circle of continual learning and growth. Hence, encouraging knowledge acquisition and use can boost research productivity.

6. Conclusions and Implications

This study aims to examine the determinants of academic research productivity in Malaysia. Using a questionnaire as the main instrument and PLS-SEM as the main analysis tools, the result indicated that commitment, leadership, authority, academic integrity, technology, attitude, subjective norm, academic discipline, and knowledge behaviour significantly influence research productivity. However, management support and knowledge intention do not significantly influence research productivity. The findings contributed to the implications discussed in the later section.

6.1 Theoretical Implications

Research productivity is one area where the Theory of Planned Behaviour (TPB) has been successfully applied to explain and forecast human behaviour. However, the influence of social networks and relationships, which are crucial elements in fostering academic and scientific collaboration, are not taken into consideration by TPB. The Social Capital Theory (SCT) offers a paradigm for comprehending the social networks and assets that promote communication and cooperation. When TPB and SCT are combined, a complete knowledge of research productivity can be obtained because both individual and social aspects are considered.

According to a recent study, ten out of twelve hypotheses examined using the combined TPB-SCT framework were supported. Furthermore, the study showed that personal and social variables, including network linkages and trust, strongly influenced research productivity. Personal variables included attitudes, subjective norms, and perceived behavioural control. In light of this, it is possible that the TPB-SCT framework can be a useful instrument for assessing and comprehending research productivity in academic and scientific environments.

The Theory of Planned Behavior may also be expanded to include more pertinent elements like motivation, emotional states, and cultural standards. As a result, it would be possible to develop a more nuanced understanding of the complicated elements that affect research productivity and learn how to use those aspects to improve individual and group research outcomes. As a result, researchers may increase their understanding of research productivity and help advance knowledge and innovation by continually improving and expanding theoretical frameworks.

6.2 Managerial Implications

The Malaysian national development strategy emphasises research productivity. In recent years, the Malaysian government has placed a substantial emphasis on research and development (R&D) to increase the country's competitiveness in the global economy. In Malaysia, the research productivity model is significant for several reasons.

First, the research productivity model provides a framework for comprehending the factors that affect Malaysia's research production. The model outlines several variables, including leadership, management support, technology, academic integrity, and academic discipline, that can influence research productivity. By recognising these elements, policymakers and stakeholders can build effective measures to increase Malaysia's research output. To stimulate research and development, the Malaysian government has developed efforts such as the National Science, Technology, and Innovation Policy (2013-2020) and the Malaysia Education Plan (2015-2025). Based on understanding the factors that drive research productivity, these efforts strive to remedy the gaps in the current research environment.

Second, the research productivity model can assist Malaysian universities and research institutions in enhancing their research production. Universities and research institutions are crucial to Malaysia's research productivity. The research productivity model offers universities and research institutes a framework for identifying the factors influencing research productivity and developing strategies to address them. Universities and research institutes, for instance, might utilise the research productivity model to evaluate their existing research environment and identify areas where changes are necessary. Additionally, they can utilise the model to build ways to increase leadership, management support, technology, academic integrity, and academic discipline to boost research output.

Thirdly, the research productivity model can facilitate the recruitment and retention of bright researchers in Malaysia. In attracting and keeping excellent researchers, Malaysia confronts significant

competition from other nations. The research productivity model can assist Malaysia in fostering an atmosphere conducive to research production. By enhancing leadership and management support, for instance, universities and research organisations can develop a culture of collaborative and supportive research that attracts brilliant researchers. By investing in technology, Malaysia can give researchers the tools and resources they need to undertake productive research. Malaysia can develop a climate that appreciates high-quality research findings and pays scholars accordingly by supporting academic integrity and discipline.

Fourthly, the research productivity model can assist Malaysia in increasing its research production and global influence. Malaysia has set the lofty goal of being among the world's top 20 most competitive nations by 2050. Productivity in research is key to accomplishing this objective. By identifying the factors that determine research productivity and devising strategies to address them, the research productivity model can assist Malaysia in increasing its global research production and impact. For instance, Malaysia may develop a research ecosystem that promotes high-impact research by strengthening leadership and management support. Malaysia can harness emerging technologies to perform cutting-edge research if it invests in technology. By supporting academic integrity and discipline, Malaysia can ensure that its research results are of the highest calibre and have a significant impact.

In conclusion, the research productivity model is essential in Malaysia because it provides a framework for comprehending the issues that affect research productivity and formulating methods to address them. As a result, Malaysia can fulfil its development goals, recruit and retain bright researchers, expand its global research output and influence, and become competitive in the global economy through increasing research productivity.

7. Limitations and Future Work

The Theory of Planned Behavior and Social Cognitive Theory (TPB-SCT) is a widely utilised theoretical framework that aims to comprehend the factors influencing research productivity. Even so, the model may comprehensively encompass only some variables that impact research productivity. For example, the abovementioned approach may fail to consider variances in personal motivation, creativity, or resource accessibility. The theoretical framework posits that the variables of attitudes, subjective norms, and perceived behavioural control serve as the sole determinants of both intention and behaviour. However, it is plausible that additional factors, such as personality traits, values, and emotions, may also significantly influence these outcomes. Moreover, it is worth noting that the TPB-SCT model's generalizability may be limited across various research domains, given that certain fields may entail distinctive variables that impact research productivity, which the model does not encompass. Potential avenues for future research in this domain may entail exploring the potential impact of additional factors on research productivity, including but not limited to motivation, creativity, and resource accessibility. A potential avenue of inquiry involves conducting comparative analyses between the TPB-SCT model and alternative theoretical frameworks to ascertain the most effective model in elucidating research productivity across diverse academic disciplines. In addition, longitudinal investigations may be carried out to enhance comprehension of the dynamics of the TPB-SCT framework over time and its influence on research productivity.

Research has been conducted to investigate the potential moderating or mediating variables that impact research productivity. Notwithstanding, these investigations may encounter challenges associated with measurement, including the dependability and accuracy of the tools employed. Furthermore, it is plausible that additional moderating or mediating variables exist that need to be accounted for in the current body of literature. Future avenues for research in this domain may encompass the exploration of supplementary moderating or mediating factors, such as personality traits or emotional intelligence, and their interplay with other predictors of research efficacy. Advanced statistical techniques, such as structural equation modelling, could enhance the comprehension of intricate associations among potential moderating or mediating variables and research productivity in studies.

The extent of the investigation can also influence the comprehension of research efficiency. Research endeavours may encounter challenges regarding generalizability, whereby the findings may solely apply to particular populations or circumstances. The generalizability of research findings may

be limited, as demonstrated by the potential lack of applicability of findings from studies conducted in one field to another. Future avenues for research in this domain may encompass the execution of investigations with more extensive and heterogeneous cohorts to enhance the applicability of their results. In addition, further investigations could be conducted to examine research productivity in diverse disciplines and contexts to better understand the determinants that impact productivity across various fields. Through this approach, scholars can acquire a more exhaustive comprehension of research productivity and the variables that influence it.

8. Co-author contribution

The authors affirmed that there is no conflict of interest in this article. Author 1 built the concept of knowledge sharing intention and related theories, and prepared the literature review. Author 2 analysed the data, wrote findings of the study, Author 3 carried out the fieldwork, wrote the research methodology and did the data entry. Author 4 wrote the discussion and conclusion part of the article. Author 5 helped out the statistical analysis and provided related references. Last but not least, Author 6 did the proofread for the whole article.

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