Journal of Advanced Research in Social and Behavioural Sciences

Journal homepage:
https://karyailham.com.my/index.php/jarsbs/index
ISSN: 2462-1951

Analysis of Causal Relationships of Lecturer's Motivation in Teaching English to Undergraduate Students using DEMATEL Technique

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ARTICLE INFO

Article history:
Received 29 March 2025
Received in revised form 22 May 2026
Accepted 15 June 2026
Available online 21 June 2026

Keywords:

DEMATEL; lecturer motivation; causal analysis; decision-making model; English language teaching

ABSTRACT

Lecturers' motivation plays a crucial role in ensuring the success of teaching English at the undergraduate level. However, it is challenging to determine the most significant factor in the lecturer's motivation due to its interconnectedness and complexity. This study utilises the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method to analyse and visualise the causal relationships among the vital factors that contribute to lecturers' motivation. Data were gathered from a group of academic experts and experienced English lecturers who analysed the extent of contribution among recognised factors through a structured scale. Normalisation and transformation into a total-relation matrix of the average direct-relation matrix were carried out to identify prominence (D + R) and causal influence (D – R) results. The results reveal that intrinsic factors, including professional commitment and self-efficacy, are the major causal factors, while support from institutions, management of workload, recognition, and student engagement are effect factors of varying degrees. The cause-and-effect diagram illustrates the key outcomes and further encourages institutional involvement. The study gathers empirical evidence that can facilitate effective teaching and learning planning by identifying pivotal factors to improve lecturers' motivation and, eventually, increase the effectiveness of language teaching. DEMATEL use provides a sophisticated yet beneficial framework for comprehending complex motivational factors in educational institutions.

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https://doi.org/10.37934/arsbs.44.1.118133

1. Introduction

Lecturer motivation is widely recognised as a foundation of effective teaching, especially in higher education settings where student outcomes are closely linked to the quality and enthusiasm of tutors [1]. In the context of English language education at the undergraduate level, motivated lecturers demonstrate greater commitment, implement innovative teaching strategies, and foster higher student engagement, collectively enhancing educational outcomes [2]. However, motivation is fundamentally multi-layered, influenced by individual, institutional, and circumstantial factors, making it challenging to recognise which basics most significantly encourage lecturer performance.

Studies show that individual factors, such as professional commitment and self-efficacy, play a crucial role in shaping teaching actions. Professional commitment reflects a lecturer's devotion to their discipline and accountability for encouraging student learning, while self-efficacy encompasses their confidence in conveying content effectively and handling classroom tasks [3,4]. On the other hand, institutional issues, as well as support from management, job organisation, and recognition of teaching efforts, are peripheral factors that can either enable or hamper a lecturer's motivation [5]. As for student-related aspects, active-learning pedagogy is associated with higher student engagement, which in turn reinforces lecturers' sense of efficacy and fulfilment [6].

The intricate interrelations among these aspects impose analytical approaches capable of plotting and measuring causal effects. The Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique has emerged as a robust tool for understanding such interconnectedness in multi-factor systems [7]. DEMATEL enables investigators to differentiate between cause factors (those that mainly influence others) and effect factors (those that are principally influenced), thus providing actionable insights for policymakers and established leaders. By applying DEMATEL to lecturer-driven English language instruction, this research aims to identify the vital drivers that can inform strategic interventions to improve teaching excellence.

Deciphering the causal form of motivational reasons is crucial for colleges and universities aiming to maximise teaching results. For instance, if professional obligation and self-efficacy are considered robust causal factors, targeted professional development initiatives, mentoring, and recognition arrangements can be planned to strengthen them. Simultaneously, recognising effect issues, including workload supervision and student engagement, can lead to division and organisational guidelines to improve support for educators in attaining anticipated instructional outcomes. This examination adds depth to the instructor's scholarly understanding of their drive and also offers real-world applications of evidence-based approaches in language instruction.

Specific Research Issue Details

Educators' eagerness is an important aspect in determining the value of teaching, predominantly in teaching English to undergraduate students. Inspired teachers are inclined to display heightened engagement, integrate advanced instructional methods, and achieve better student learning outcomes [1,2]. In comparison, educators lacking motivation may exhibit reduced eagerness, diminished teaching effectiveness, and reduced commitment to student development, which can undermine students' learning achievement and language skills [8].

The intricacy of an educator's drive arises from its multi-dimensional landscape. It is influenced by individual, institutional, and student-related factors, all of which are interrelated and strongly influence one another. Personal aspects include professional obligations that mirror the educator's inherent devotion to their job, teaching duties, and self-efficacy, which refers to educators' confidence in their ability to successfully support education [3,4]. Educators with strong professional

obligations and high self-efficacy are more likely to engage in active teaching, adapt well to classroom challenges, and sustain enthusiasm despite the job's burdens [9].

Institutional aspects specifically foster enthusiasm through external support mechanisms. Support from institutions, such as routes to mentoring, professional development, acknowledgement, and distribution of means, directly influences lecturers' ability to operate effectively [5]. Equally, capacity management is a significant factor that can reduce the time and energy academics can dedicate to excellence in education, thereby lowering their motivation [10].

Causes related to students, particularly their focus on class work, are both a stimulus and the result of commendable teaching. Focused students give good responses, involvement and motivate educators to keep improving their teaching techniques [6]. On the contrary, reduced focus on the part of students can adversely affect educators' principles and enthusiasm in teaching, illustrating the mutual nature of educational practice [11].

Despite an in-depth study of numerous motivational factors, it remains challenging to identify the causal structure among them. Old-fashioned statistical strategies usually cannot successfully catch the undeviating and the unintended effects among these aspects. This paper fulfils this gap by using the Decision-Making Trial and Evaluation Laboratory, or DEMATEL technique. This method permits a proper study of the intricate interrelations among all the factors and also differentiates cause factors from effect factors [7].

By using the DEMATEL method to examine the lecturer's motivation, this study aims to provide deeper insight into the hierarchical structure of reasons and to enable educational organisations to focus on interventions. For example, refining professional obligation and self-efficacy, as they are recognised causal factors, through directed exercise and acknowledgement programs, could have a cascading effect on other motivational constituents. This, in turn, improves teaching efficiency in English language classrooms. This method deepens academic knowledge and provides everyday support to institutional authorities and policymakers in devising approaches to maximise educators' performance.

1.1 Issue Implications

Lecturers' motivation plays a crucial role in shaping teaching effectiveness and students' learning outcomes in higher education. Lecturers who are highly motivated are more inclined to implement innovative teaching approaches, deliver prompt feedback and actively involve students in the learning process, all of which contribute directly to improved learning outcomes and enhanced language proficiency [1,2]. In contrast, low levels of lecturer motivation may result in reduced enthusiasm, limited classroom communication, and dependence on routine teaching practices, which can adversely affect students' focus and academic achievement [8].

From an institutional standpoint, gaining insight into the causal structure of a lecturer's drive, as identified through DEMATEL analysis, enables higher institutions to focus their interventions on key driving factors, such as professional obligation and self-efficacy. By reinforcing these elements, institutions can subtly enhance outcome-related factors such as student engagement and workload organisation. Thus, fostering a more effective teaching and learning environment [4,9]. For example, professional development opportunities, mentoring programs, and recognition schemes can strengthen lecturers' feelings of competence and autonomy, thereby boosting their motivation to provide first-rate teaching [5].

The impact of a lecturer's inspiration extends beyond the execution of self-teaching. Lecturers who are highly motivated help drive positive institutional outcomes, including increased student retention, enhanced academic standing, and more efficient curriculum delivery [10]. Additionally,

students instructed by motivated educators are more likely to cultivate language proficiency, critical thinking abilities and enduring learning conduct, all of which are vital for success in both academic and professional settings [11]. Conversely, overlooking lecturers' drive can intensify issues such as burnout, high staff turnover and declining students' performance, leading to broader inefficiencies within higher education institutions [8].

A key applied implication of this study is that focusing interventions on the primary motivational drivers can generate ripple effects throughout the educational environment. Policy makers and university personnel can use these insights to strategically distribute resources, establish helpful institutional guidelines and cultivate a motivational culture that boosts lecturers' satisfaction and students' success. Over the long term, systematically enhancing lecturers' motivation leads to lasting enhancements in the quality of English language instruction. Thus, reinforcing the broader education structure.

1.2 Solution Strategies

1.2.1 Steps addressing the lecturer's motivation in English language teaching

Recognise Main Causal Factors Through DEMATEL Analysis

The initial step involves systematically determining which motivational factors serve as causal drivers and which function as effect factors. In this study, the DEMATEL analysis aids in differentiating between elements such as professional commitment and self-efficacy, and between causes and factors, such as students' engagement and workload management, and their effects. This approach enables institutions to implement interventions purposefully rather than treating all factors equally [7,12].

Improve Professional Commitment via Recognition and Career Growth

Professional obligation can be enhanced by offering career advancement opportunities, acknowledging teaching excellence and cultivating a strong sense of reason in the career. Initiatives such as mentorship programs, teaching awards and participation in curriculum development can boost lecturers' inherent drive and dedication to students' learning [2,9].

Enhance Self-Efficacy via Training and Support Initiatives

Self-efficacy can be strengthened through focused professional development programs, workshops on teaching strategies, classroom management, and the use of educational technology. Additionally, offering constructive criticism and fostering peer support help bolster teachers' confidence in their teaching abilities, directly enhancing their motivation and performance [3,4].

Enhance Institutional Support and Optimise Workload Supervision.

Organisations should adopt guidelines that minimise administrative tasks, supply adequate teaching means and maintain equitable workload allocation. Supportive measures, such as providing teaching assistants, unrestricted scheduling, and formal recognition, enable lecturers to focus on educational quality rather than administrative responsibilities. Thus, enhancing their teaching motivation [5,10].

Promote Students' Engagement as a Mutual Driver of Motivation

Although students' engagement is primarily an outcome factor, it can also strengthen lecturers' motivation. Implementing active learning techniques, collaborative teaching approaches, and

continuous feedback mechanisms encourages greater students' participation, which in succession, inspires educators to uphold elevated teaching ideals [11,6].

Track and Assess Effectiveness of Motivation Interferences

Organisations should consistently evaluate lecturers' motivation using surveys, performance indicators and observational methods. Periodic application of tools like DEMATEL enables institutions to measure the impact of interventions and refine strategies accordingly. Ongoing supervision ensures that improvements in causal factors lead to sustained positive outcomes in effect factors [12,5].

By methodically implementing these stages, higher education organisations can foster an environment that strengthens lecturers' motivation, elevates educational quality, and ultimately enhances students' learning outcomes in English activities. Targeting the key causal factors confirms that interventions are both effective and meaningful, optimising benefits for the institution and its educational objectives.

1.3 Literature Review

1.3.1 Lecturers' motivation in higher education

Lecturers' motivation is widely regarded as a key factor influencing teaching quality and student achievement in higher education. Motivated lecturers tend to be more engaged, employ innovative teaching strategies and promote improved learning outcomes [1,2]. This motivation is shaped by both intrinsic elements, such as professional commitment and self-efficacy, and extrinsic factors, including institutional support, workload management and recognition [3,5]. In undergraduate English language teaching, lecturers' motivation plays a crucial role in shaping the instructional effectiveness, students' language development and overall satisfaction with the learning experience [8].

1.3.2 Intrinsic factors: Professional dedication and self-efficacy

Professional commitment represents lecturers' dedication to their field and their sense of responsibility for students' learning outcomes. Studies indicate that lecturers with strong professional commitment are more likely to engage in proactive teaching practices, uphold high instructional standards and persist despite challenges such as heavy workloads or administrative demands [9,4]. Similarly, self-efficacy, which is lecturers' confidence in their ability to effectively carry out teaching tasks, has been closely linked to both motivation and teaching effectiveness. Lecturers with higher self-efficacy are better equipped to handle classroom difficulties, apply innovative teaching strategies and enhance students' engagement [3,4].

1.3.3 Extrinsic factors: Institutional support, workload organization and students' involvement

Institutional support is crucial in influencing lecturers' motivation. Providing access to resources, professional development, recognition initiatives and administrative assistance helps reduce obstacles to effective teaching while boosting lecturers' intrinsic motivation [5,10]. Effective workload management, such as fair allocation of teaching and administrative responsibilities, also impacts lecturers' capacity to maintain instructional quality and stay motivated [8]. Moreover, students' engagement functions both as a result of and a driver for lecturers' motivation, as active

participation, feedback and responsiveness from students enhance teaching satisfaction and reinforce motivation [11,6].

1.3.4 Approaches for examining motivation and its causal links

Although many studies have examined factors influencing lecturers' motivation, most focus on individual elements without exploring the causal connections between them. Conventional survey-based methods can reveal correlations but often do not capture the direct and indirect effects that one factor may have on another [12]. The Decision-Making Trial and Evaluation Laboratory (DEMATEL) method addresses this limitation by offering a systematic framework to analyse the interrelationships among factors and differentiate between cause factors (drivers) and effect factors (receivers) [7,13]. DEMATEL has been effectively used in educational research to map complex systems, identify key influencing factors and guide evidence-based decision-making [12].

1.4 Research Gap

Although there is a substantial body of research on teachers' and lecturers' motivation, notable gaps still exist that warrant the present study. First, a large portion of the existing literature focuses on individual factors affecting motivation, such as professional growth, self-efficacy, and institutional support, without exploring the interconnections and causal relationships among these elements [2,3]. This constrains a comprehensive understanding of how particular factors interact and which ones serve as the primary drivers of lecturers' motivation in higher education settings.

Second, although the self-determination concept and similar frameworks offer valuable perspectives on intrinsic and extrinsic motivation [1,5], they frequently overlook the dynamic, system-level interactions among individual, institutional and student-related reasons. For instance, the indirect impact of professional commitment on student engagement, which is mediated by factors such as self-efficacy or institutional support, has seldom been empirically measured. Consequently, a gap remains in distinguishing causal factors from their effects, which is essential for developing targeted interventions that are efficient and effective.

Third, there is a scarcity of research focusing specifically on English language instruction at the undergraduate level. Although motivation has been extensively examined in general education and STEM fields, the distinct challenges associated with teaching English, such as fluctuations in students' engagement, differences in language proficiency, and limitations within the curriculum, require analyses tailored to this context [8,11]. Consequently, there is a lack of robust empirical evidence identifying the most influential motivational factors for lecturers teaching English at the undergraduate level, especially within higher education institutions in non-native English-speaking environments.

Lastly, much of the existing research relies on qualitative insights or conventional survey methods that do not quantitatively capture causal relationships among variables. In contrast, the DEMATEL method employed in this study fills this gap by providing a systematic framework for identifying both direct and indirect effects, differentiating between cause-and-effect factors, and illustrating their interrelationships. This enhances not only the theoretical perspective but also provides practical guidance for institutional decision-makers, an area that previous studies have yet to comprehensively address [7,12].

By addressing these gaps, the present study offers a thorough, structured analysis of lecturers' motivation in English language teaching, highlighting key factors and their interconnections. This, in turn, allows higher education institutions to develop evidence-based strategies to improve

motivation and overall teaching effectiveness. Existing research on lecturer motivation rarely applies DEMATEL to analyse causal relationships in undergraduate English language teaching, often overlooking the unique challenges of this context. This study addresses that gap by using DEMATEL to provide a quantitative understanding of these relationships, supporting more targeted strategies to enhance motivation and teaching effectiveness.

2. Methodology

This study used the DEMATEL method. The Decision-Making Trial and Evaluation Laboratory (DEMATEL) method represents a sophisticated structural modelling technique originally developed by the Science and Human Affairs Program of the Battelle Memorial Institute of Geneva between 1972 and 1976 to analyse complex world problems [7]. This method has evolved into a powerful multi-criteria decision-making tool that enables researchers to visualise causal relationships among factors in complex systems by constructing structural models and impact-relation maps [14]. The fundamental premise of DEMATEL lies in its ability to transform qualitative assessments into quantitative indices, thereby revealing the interdependencies and feedback mechanisms among system elements [13]. Unlike traditional analytical methods that assume independence among criteria, DEMATEL acknowledges the intricate interrelationships and mutual influences that characterise real-world decision-making scenarios, making it particularly valuable for identifying key factors and understanding their direct and indirect effects on other elements within a system [12]. The method has been extensively applied across diverse domains, including supply chain management, environmental assessment, technology evaluation, and organisational performance analysis, demonstrating its versatility and robustness in handling complex decision problems [15,16].

2.1 DEMATEL Procedural Framework

The implementation of DEMATEL follows a systematic five-step procedure that transforms expert judgments into structural matrices revealing causal relationships. The first step involves establishing a direct-relation matrix through expert evaluation, where participants assess the degree of direct influence between each pair of factors using a predetermined scale, typically ranging from 0 (no influence) to 4 (very high influence) [17]. The second step normalises the direct-relation matrix by dividing each element by the maximum row sum, ensuring all values fall within a standardised range [18]. The third step calculates the total-relation matrix by incorporating both direct and indirect effects through matrix manipulation, specifically using the formula T = X(I - X)^-1, where X represents the normalized direct-relation matrix and I is the identity matrix [19]. The fourth step computes the prominence and relation indices by calculating the sum of rows (D) and columns (R) of the total-relation matrix, where D + R indicates the prominence of each factor in the system, while D - R distinguishes between cause factors (positive values) and effect factors (negative values) [20]. The fifth step involves constructing a causal diagram by plotting these indices on a two-dimensional graph, with the horizontal axis representing prominence and the vertical axis representing relation, thereby providing a visual representation of the structural model that facilitates decision-making and strategic planning [21,22].

2.2 Steps in DEMATEL

Step 1	**Step 1: Generate the direct relation matrix**

	To identify the model of the relations among the n criteria, an n × n matrix is first generated. The effect of the element in each row is exerted on the element of each column of this matrix. If multiple experts' opinions are used, all experts must complete the matrix. arithmetic mean of all of the experts ' opinions is used and then a direct relation matrix X is generated. $$X = [0 \ \cdots \ x_{n1} \ \vdots \ddots \vdots \ x_{1n} \ \cdots \ 0 \ ]$$
Step 2	**Compute the normalized direct-relation matrix** To normalize, the sum of all rows and columns of the matrix is calculated directly. The largest number of the row and column sums can be represented by k. To normalize, it is necessary that each element of the direct-relation matrix is divided by k. $$k = \max\{\max \sum_{j=1}^{n} x_{ij}, \sum_{i=1}^{n} x_{ij}\}$$ $$N = \frac{1}{k} * X$$
Step 3	**Compute the total relation matrix** After calculating the normalized matrix, the fuzzy total-relation matrix can be computed as follows: $$T = (N^1 + N^2 + \cdots + N^k)$$ In other words, an n × n identity matrix is first generated, then this identity matrix is subtracted from normalized matrix and the resulting matrix is reversed. The normalized matrix is multiplied by the resulting matrix to obtain the total relation matrix. $$T = N \times (I - N)^{-1}$$
Step 4	**Set the threshold value** The threshold value must be obtained in order to calculate the internal relations matrix. Accordingly, partial relations are neglected and the network relationship map (NRM) is plotted. Only relations whose values in matrix T is greater than the threshold value are depicted in the NRM. To compute the threshold value for relations, it is sufficient to calculate the average values of the matrix T. After the threshold intensity is determined, all values in matrix T which are smaller than the threshold value are set to zero, that is, the causal relation mentioned above is not considered. In this study, the threshold value is equal to 1.313
Step 5	**Final output and create a causal diagram** The next step is to find out the sum of each row and each column of T (in step 3). The sum of rows (D) and columns (R) can be calculated as follows: $D = \sum_{j=1}^{n} T_{ij}$ $R = \sum_{i=1}^{n} T_{ij}$ Then, the values of D+R and D-R can be calculated by D and R, where D+R represent the degree of importance of factor i in the entire system and D-R represent net effects that factor i contributes to the system.

2.3 Sampling Technique for DEMATEL Application

The selection of appropriate sampling techniques constitutes a critical component in DEMATEL implementation, as the quality and representativeness of expert judgments directly influence the validity and reliability of the resulting structural model. Purposive sampling, also known as judgmental or expert sampling, is the most commonly employed technique in DEMATEL studies, in which researchers deliberately select participants based on their specialised knowledge, extensive experience, and deep understanding of the problem domain under investigation [23]. The determination of optimal sample size in DEMATEL applications remains a subject of scholarly debate, with recommendations typically ranging from 5 to 15 experts, as this range balances the need for diverse perspectives against the practical constraints of data collection and consensus building [24]. Researchers employ several criteria for expert selection, including professional experience of at least 5 years in the relevant field, academic qualifications at the master's level or higher, current involvement in related decision-making processes, and demonstrated expertise through publications or practical achievements [25]. However, in this study, we used 5 experts as the main participants.

2.4 DEMATEL Questionnaire Scale Explanation

This study employs the DEMATEL (Decision Making Trial and Evaluation Laboratory) methodology to analyse the causal relationships among the identified factors. Respondents are required to assess the direct influence of each factor on other factors using a five-point scale. The scale is defined as follows: 0 = No influence, indicating that one factor has absolutely no impact on another; 1 = Low influence, suggesting minimal impact; 2 = Moderate influence, representing a reasonable degree of impact; 3 = High influence, indicating substantial impact; and 4 = Very high influence, denoting an extremely strong causal relationship between factors. This numerical scale allows for systematic quantification of expert judgments regarding the interdependencies among variables. The collected responses are subsequently aggregated to form an initial direct-relation matrix, which is then normalised and subjected to matrix operations to derive the total-relation matrix. From this matrix, key indicators, including prominence values (R+C) and relation values (R-C), are calculated, enabling classification of factors into cause-and-effect groups. The prominence value indicates the overall importance of a factor within the system, while the relation value determines whether a factor primarily influences others (cause) or is predominantly influenced by others (effect). This analytical approach provides valuable insights into the structural relationships among variables and facilitates evidence-based decision-making by identifying critical factors that warrant prioritised attention in intervention strategies.

3. Results

This section presents the result of the causal relationships among the vital factors that contribute to lecturers' motivation which utilises the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method to analyse and visualise the result. There are five experts in the field that participated in the study and answered questionnaire on lecturers' motivations. This study focuses on five motivational factors; Professional Commitment, Self-Efficacy, Institutional Support, Workload Management and Student Engagement. The relationships among these five motivations are discussed in this section.

The average direct-relation matrix is calculated by taking the matrices' mean by the experts. The average direct-relation matrix shows the mean influence scores calculated from evaluations by five experts, indicating how each factor influences the others in lecturers' motivation to teach English to

undergraduate students. In this matrix, rows represent influencing factors and columns represent the factors being influenced, with diagonal values set to 0 since a factor does not affect itself.

Table 1
Average Direct-Relation Matrix

	Professional Commitment	Self-Efficacy	Institutional Support	Workload Management	Student Engagement
Professional Commitment	0.0000	3.4000	2.2000	3.0000	3.6000
Self-Efficacy	3.0000	0.0000	2.4000	2.0000	3.4000
Institutional Support	2.2000	2.4000	0.0000	3.0000	2.8000
Workload Management	3.0000	2.0000	2.0000	0.0000	2.0000
Student Engagement	3.0000	3.2000	2.0000	2.0000	0.0000

The findings reveal that Professional Commitment has a strong impact on Students' Engagement (3.6000) and Self-Efficacy (3.4000), suggesting that highly committed lecturers tend to enhance both their teaching confidence and students' participation. Likewise, Self-Efficacy strongly influences Professional Commitment (3.0000) and Student Engagement (3.4000), indicating that lecturers confident in their teaching skills are more dedicated and better able to engage their students. Institutional Support moderately affects Workload Management (3.0000) and Students' Engagement (2.8000) implying that supportive policies and resources help lecturers manage responsibilities and foster classroom interaction. Workload Management moderately impacts Professional Commitment (3.0000) but has weaker effects on other factors, while Students' Engagement also influences Professional Commitment (3.0000) and Self-Efficacy (3.2000), highlighting the reciprocal relationship between motivated students and lecturers. Overall, this matrix presents the initial direct relationships among the five motivational factors which will later be normalized and converted into a total-relation matrix to determine the most influential cause and effect factors in the DEMATEL analysis. The matrix is scaled so that the largest sum of any row or column is equal to 1.

Table 2
Normalized Direct-Relation Matrix

	Professional Commitment	Self-Efficacy	Institutional Support	Workload Management	Student Engagement
Professional Commitment	0.0000	0.2787	0.1803	0.2459	0.2951
Self-Efficacy	0.2459	0.0000	0.1967	0.1639	0.2787
Institutional Support	0.1803	0.1967	0.0000	0.2459	0.2295
Workload Management	0.2459	0.1639	0.1639	0.0000	0.1639
Student Engagement	0.2459	0.2623	0.1639	0.1639	0.0000

The normalised direct-relation matrix is created by adjusting the average direct-relation matrix so that the row or column with the highest sum equals 1, enabling all influence values to be standardised and directly comparable within the DEMATEL analysis. Each value in this matrix reflects the relative influence among the five motivational factors: Professional Commitment, Self-Efficacy, Institutional Support, Workload Management, and Students' Engagement. The findings indicate that Professional Commitment strongly affects Students' Engagement (0.2951) and Self-Efficacy (0.2787), suggesting that lecturers with high professional dedication tend to enhance both students' participation and their own teaching confidence. Similarly, Self-Efficacy significantly influences Students' Engagement (0.2787), suggesting that confident lecturers can better engage students. Institutional Support moderately impacts Workload Management (0.2459) and Students' Engagement (0.2295), emphasising the importance of institutional resources and policies in supporting effective teaching. Additionally, Workload Management and Students' Engagement exhibit moderate reciprocal effects on other factors, demonstrating the interconnected nature of lecturers' motivation. Overall, this normalised matrix standardises the influence scores and sets the stage for the next DEMATEL step, which is calculating the total-relation matrix to assess both direct and indirect relationships among the motivational factors.

$T = X(I - X)^{-1}$ results in both direct and indirect influences between factors.

Table 3
Total-Relation Matrix

	Professional Commitment	**Self-Efficacy**	**Institutional Support**	**Workload Management**	**Student Engagement**
Professional Commitment	1.3569	1.5615	1.2326	1.4082	1.6444
Self-Efficacy	1.4331	1.2264	1.1487	1.2476	1.5115
Institutional Support	1.3335	1.3301	0.9398	1.2550	1.4151
Workload Management	1.2594	1.1935	0.9872	0.9532	1.2510
Student Engagement	1.3805	1.3816	1.0842	1.1995	1.2379

The total-relation matrix ($T = X(I - X)^{-1}$) integrates both direct and indirect influences among the five motivational factors, offering a comprehensive perspective on how each factor impacts and is influenced by the others in lecturers' motivation for teaching English. Each value represents the overall effect of one factor on another, including cascading impacts through intermediate factors. For example, Professional Commitment strongly affects Students' Engagement (1.6444) and Self- Efficacy (1.5615), indicating that highly committed lecturers not only directly enhance students' participation and their own teaching confidence but also indirectly strengthen these outcomes through other factors. Likewise, Self-Efficacy has a notable influence on Professional Commitment (1.4331) and Students' Engagement (1.5115), demonstrating reciprocal reinforcement in motivation. Institutional Support and Workload Management also affect multiple factors, though to a slightly lesser extent, highlighting that supportive institutional policies and balanced workloads contribute to overall teaching motivation both directly and indirectly. To sum up, the total-relation matrix captures the complete network of interactions among motivational factors, which is crucial for

identifying key causal drivers (cause factors) and more reactive or resultant factors (effect factors) in the DEMATEL cause–effect analysis.

Table 4
Threshold Values
Threshold Value: **1.3129** | Number of Experts: **5** | Number of Factors: **5**

Factor	R (Influence)	C (Influenced)	R+C (Prominence)	R-C (Relation)
Professional Commitment	7.2037	6.7634	13.9671	0.4403
Self-Efficacy	6.5673	6.6932	13.2604	-0.1259
Institutional Support	6.2735	5.3926	11.6661	0.8809
Workload Management	5.6443	6.0635	11.7077	-0.4192
Student Engagement	6.2838	7.0599	13.3437	-0.7762

The DEMATEL table presents the causal relationships among the five factors influencing lecturers' motivation. The R values indicate the total influence a factor has on others, while the C values show the extent to which it is affected by other factors. The R+C column (prominence) reflects the overall significance of each factor, and R−C (relation) distinguishes causal factors (positive values) from effect factors (negative values). According to the table, Professional Commitment (R−C = 0.4403) and Institutional Support (R−C = 0.8809) emerge as key causal drivers with strong impacts on other factors, whereas Students' Engagement (R−C = −0.7762), Workload Management (R−C = −0.4192) and Self-Efficacy (R−C = −0.1259) function more as influenced outcomes. All factors surpass the prominence threshold of 1.3129, emphasising their critical roles within the lecturers' motivation system.

3.1 Causal and Resultant Relationship

Factors with R−C values greater than 0 are considered CAUSE (influencers) while those with R−C values less than 0 are considered EFFECT (receivers). The cause–effect relationship represented by the (ri−ci) value categorises factors into cause-and-effect groups. The prominence value (ri-ci) gives better overview on the significant of each factor within the system.

Table 5
Factors and R-C Values

Criteria	ri	ci	ri + ci	ri – ci	Cause / Effect
Professional Commitment	7.20	6.76	13.97	0.44	**Cause**
Self-Efficacy	6.57	6.69	13.26	-0.13	**Effect**
Institutional Support	6.27	5.39	11.67	0.88	**Cause**
Workload Management	5.64	6.06	11.71	-0.42	**Effect**
Student Engagement	6.28	7.06	13.34	-0.78	**Effect**

The DEMATEL results presented in the table highlight the prominence and causal relationships among the factors affecting lecturers' motivation in teaching English to undergraduate students. The

prominence value (ri+ci) reflects the overall significance of each factor within the system. According to the table, Professional Commitment (13.97) has the highest prominence, followed by Students' Engagement (13.34) and Self-Efficacy (13.26). This suggests that these factors are the most influential within the motivational framework as they both impact and are impacted by other factors. Notably, the high prominence of Professional Commitment indicates that lecturers with strong dedication to their profession are more likely to maintain motivation in teaching, supporting previous research that links professional identity and commitment to educators' performance and persistence in teaching roles [26].

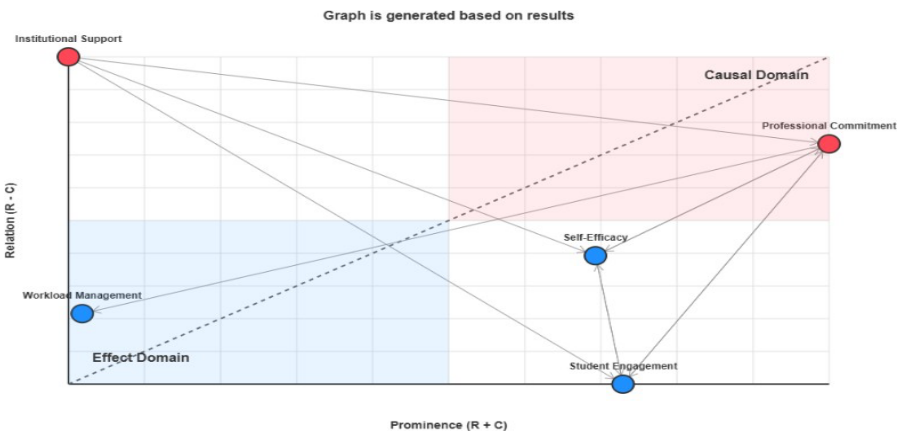
In this analysis, Institutional Support (0.88) and Professional Commitment (0.44) are identified as cause factors, indicating that they influence other elements within the system. Institutional Support emerges as the strongest causal driver, highlighting that supportive university policies, resources and leadership can significantly boost lecturers' motivation. This aligns with previous research showing that the institutional environment and organisational support are crucial determinants of teachers' motivation and job satisfaction [27]. When lecturers receive professional development opportunities, administrative encouragement and sufficient teaching resources, they are more likely to strengthen their commitment and sustain motivation in their teaching practices.

In contrast, Self-Efficacy (−0.13), Workload Management (−0.42) and Students' Engagement (−0.78) are classified as effect factors, indicating that they are primarily influenced by the causal factors. Students' Engagement has the lowest (ri−ci) value, showing that it is highly dependent on other motivational drivers. This suggests that lecturers' ability to engage students is shaped by their professional commitment and the level of institutional support provided. Similarly, improvements in workload management and self-efficacy are more likely when institutions offer strong structural support and when lecturers exhibit high professional dedication. These results align with educational motivation theories, which highlight the role of environmental and organisational factors in shaping teachers' psychological states and teaching effectiveness [3,5]. Consequently, enhancing institutional support and professional commitment can indirectly strengthen other motivational outcomes within the teaching system.

3.2 Network Diagram (Prominence vs Relation)

This network diagram highlights the prominence and relation to each motivation showing a clearer view on which motivation is much significant than others. Enabling to confirm the primary objective and causal driver among the motivation. Blue showing the effect domain, meanwhile red will show causal domain**.**

Fig. 1. Graph of Prominence (R+C) Versus Relation (R-C)



The results of this study offer an in-depth insight into how different factors interrelate to affect lecturers' motivation in teaching English to undergraduates. Using the DEMATEL approach, it was found that Professional Commitment and Institutional Support fall within the causal domain, serving as systemic drivers that strongly impact other motivational elements. Professional commitment, situated in a prominent area on the horizontal axis, R+C, positioning it as a pivotal driver. Meanwhile, institutional support is less prominent, but its high vertical placement allows it to serve as a foundational cause, enabling other motivations to take place. Hence, these two factors highlight that lecturers' personal commitment to their profession, alongside institutional backing through policies and resources, plays a crucial role in creating a motivating teaching environment. Focusing on these key drivers can lay the groundwork for enhancing other motivational outcomes in the effect domain (resultant outcomes), including Self-Efficacy, Workload Management, and Students' Engagement. Student engagement is situated at a low relation axis and should be identified as a critical outcome variable. Meanwhile, self-efficacy in the centre will mediate another motivational factor. Workload management, although shown to be of low prominence and relevance, has a peripheral effect with less impact on the overall framework.

Based on the diagram, enhancing primary outcomes such as student engagement should be the primary objective and the prioritised intervention for causal drivers: Professional Commitment and Institutional Support. This will result in a positive effect throughout the entire network.

3.3 Influence Diagram

This section is to show the visual representative of causal interdependencies within the motivational variables. The figure helps to maps the hierarchical influence chain by categorizing these factors into dichotomous framework of cause and effect.

Fig. 2 DEMATEL Influence Diagram of Hierarchical Influence Chain

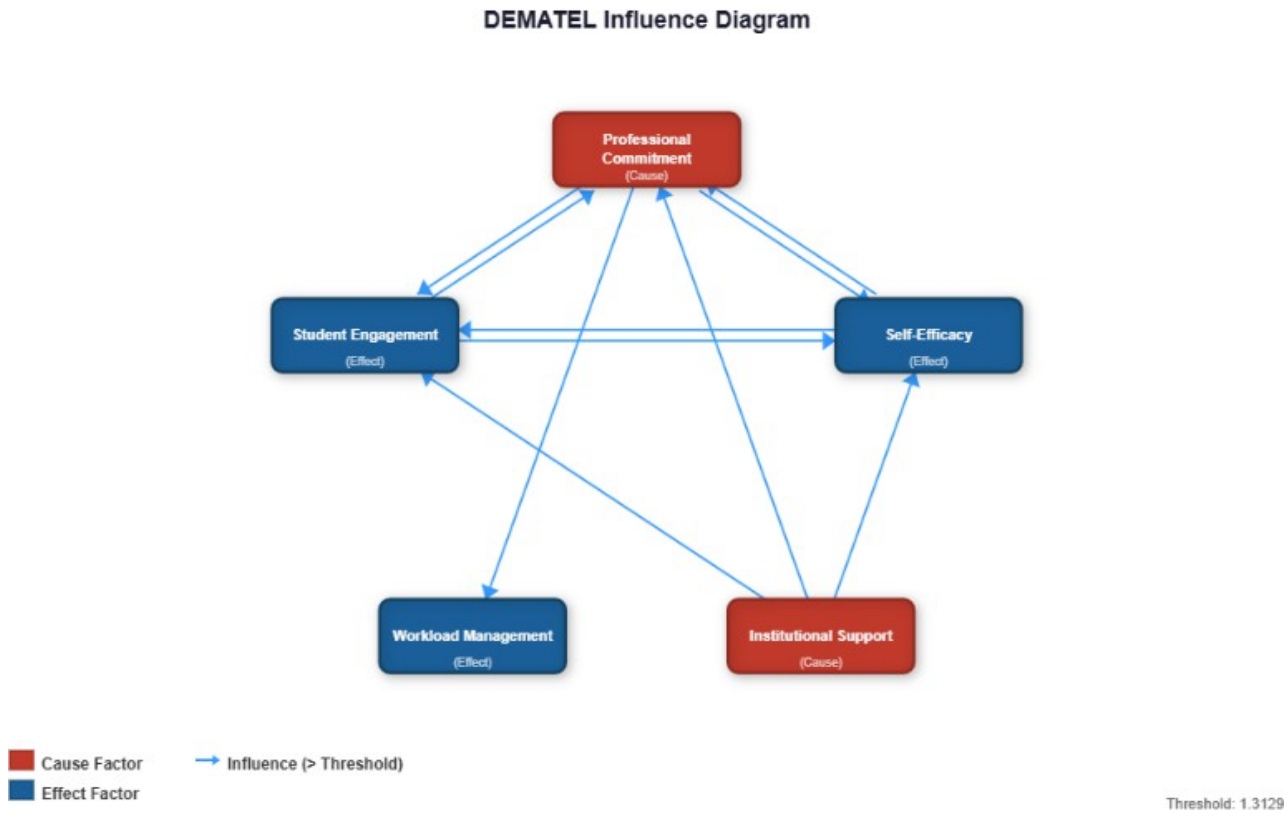


Figure 2 shows a hierarchical influence chain, and the analysis also indicates that effect factors, namely Self-Efficacy, Workload Management, and Students' Engagement, are largely shaped by the causal factors. For example, students' engagement heavily relies on lecturers' professional commitment and on the institution's support. This interdependence highlights the complex, interconnected nature of lecturers' motivation, implying that addressing the key causal factors can generate ripple effects throughout the system. Consequently, institutional initiatives such as professional development programs, recognition schemes, and strategies to optimise workload are vital for indirectly boosting lecturers' confidence, teaching effectiveness, and classroom engagement. Hence, the diagram suggests a top-down intervention strategy which consequently bolsters efficient engagement of the academic ecosystem.

4. Conclusions

In conclusion, this study offers valuable contributions to English language education in higher education, both in theory and practice. From a theoretical perspective, it illustrates how DEMATEL can effectively map complex motivational dynamics and distinguish between causal and effect factors. Practically, it delivers actionable insights for university administrators and policymakers, enabling them to strategically target interventions that strengthen lecturers' motivation. By concentrating on the key causal drivers, institutions can cultivate a sustainable and effective teaching-learning environment, ultimately enhancing students' learning outcomes and the overall quality of undergraduate English language instruction.

The result of this study extends beyond immediate institutional benefits. By focusing on the key drivers of motivation, universities can foster a sustainable and effective teaching–learning ecosystem that supports continuous professional development, encourages pedagogical innovation, and enhances collaboration among faculty members. An environment of this kind would simply yield improved learning outcomes and higher-quality language instruction. Such an environment ultimately contributes to improved student engagement, stronger learning outcomes, and a higher overall quality of undergraduate English language instruction.

Hence, this study opens the door to further research. Expansion of this research may investigate the application of DEMATEL across different educational contexts and compare findings across institutions to provide an insightful understanding of motivational dynamics. These efforts ensure long-term professional satisfaction and progress in English education.

Acknowledgement
This research was not funded by any grant.

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