Driving Factors for Learner Engagement in MOOCs: An Interpretive Structural Modeling Approach

Girish Garg[1] & Mala Rani[2]

[1]Assistant Professor, Department of Management Studies, Aryabhatta College, University of Delhi, Delhi

[2] Professor, Department of Commerce, Bharati College, University of Delhi, Delhi

Email Id: mala.rani@bharati.du.ac.in

Abstract

The impact of technology on education has revolutionized the way we teach and learn. It has widened the scope of education, making it more accessible, efficient, and effective. With the help of technology, learners can learn through various online platforms, breaking the traditional classroom barriers. This has resulted in a global learning community connecting learners from different parts of the world. The Indian government launched an initiative called SWAYAM in August 2014, which provides Massive Open Online Courses (MOOCs) to promote equal access to quality education. These courses are gaining popularity and are easily accessible to anyone with an internet connection. SWAYAM offers courses in higher education, high school, and skill sectors. This program enables learners to earn credits recorded in their academic bank of credits (ABC) to advance their careers. Variables such as curiosity, reputation, flexibility, and intention play a crucial role in driving the other variables in the final model. The study's dependent variables include credit transfer, assistance, mentor-mentee support, job prospects, and eagerness. To create MOOC courses for learners, universities and institutes must consider important factors that are crucial in today's world.

Keywords: SWAYAM, MOOCs, ABC, ISM, Higher Education

JEL Classification: Q01, O33 & G59

Introduction

The advancements in information and communication technologies are both impressive and remarkable. The development of computer devices that are smaller, cheaper, and more readily available has brought about a revolution in the way that communication is conducted. Thanks to the availability of broadband connectivity, it is now possible to transmit information across vast distances in a matter of seconds. Tablets and smartphones have further improved this capability, making education available to students in even the most remote corners of the world. These technological advancements have paved the way for the creation of online educational content and virtual higher education institutions, including Massive Open Online Courses (MOOCs). The educational landscape has been transformed by Massive Open Online Courses (MOOCs), which have revolutionized online learning. MOOCs are different from traditional methods of learning and have a much larger audience, as they are open and free to everyone (Voss, 2013). Within a short period of time, millions of people have enrolled in a few MOOCs, making it a disruptive technology that could pose a challenge to higher education institutions (Lucas et al., 2013; Mehaffy, 2012; Yuan & Powell, 2013). Although MOOCs have gained popularity, their completion rates are significantly lower

compared to those of traditional online courses. In fact, less than 10 per cent of students who enroll in a MOOC end up completing it (Breslow et al., 2013; Ho et al., 2014; Jordan, 2014; Kolowich, 2013). Although some experts argue that completion rates may not be the most accurate measure of learning in MOOCs (Ho et al. 2014; Jordan, 2014), concerns still arise about their effectiveness (Chafkin, 2013; Marcus & Davis, 2013). MOOCs are a disruptive technology in education with a significant impact on learning and the role of educators. They offer unprecedented learning opportunities to anyone with internet access, regardless of their location, and give students access to courses from some of the most prestigious institutions around the globe. Technology-based education is rapidly gaining popularity as traditional campuses struggle to meet the diverse needs of students. Open and distance learning systems are meeting the demands of individuals and communities for flexible education delivery systems. The potential of Information and Communication Technologies (ICTs) to enhance access and equity in higher education and the education sector is significant. People enrol in MOOCs for various reasons, including curiosity and career advancement (Breslow et al., 2013). However, there has been limited research on the factors that influence MOOC completion and retention. By examining the elements that contribute to the continued use of Information Systems (IS), such as MOOCs, we can gain insights into their sustainability and viability. India's government has recently launched a New Education Policy (NEP-2020), which aims to promote the multidisciplinary development of students and holistic education. The policy seeks to provide greater flexibility in learning, especially for students in far-flung areas and enables them to choose from a wide range of courses. Such courses include skill enhancement, ability enhancement, vocational courses, and language courses, allowing students to select courses based on their interests. The policy also emphasizes industry internships, which can offer practical exposure to students from all disciplines. Additionally, it encourages research, which can help inculcate a forward-looking approach and diverse perspectives in students. These measures are expected to unlock new opportunities for students and foster their talents, ultimately contributing to the country's development. The objective of this study is to identify the driving variables that enhance an individual's intention to continue utilizing MOOCs.

Literature Review

Education is the foundation for the socio-economic, cultural, and political development of a society or country. It provides people with the necessary skills, knowledge, and information. Our lives have been significantly transformed by the "disruptive power" of the internet, which has also altered "where" and "how" we obtain information. Our ability to participate in informal education from anywhere at our convenience has improved due to access to the Internet and mobile devices (Sharples et al., 2009). This "here and now" learning has enabled flexible and convenient access to knowledge, information, and content (Carr, 2012; Hill, 2012; Lucas, 2014), regardless of location (Martin and Ertzberger, 2013). Distance learning, open universities, online learning, e-learning, and open educational resources are examples of how this convenient access has disrupted traditional modes of learning (Altbach et al., 2010; Carey, 2012; Castellano, 2014; King and Sen, 2013; Yuan et al., 2008). Massive Open Online Courses (MOOCs) are also becoming more and more popular, and some academics predict that MOOCs will significantly "unbundle" (Shirky, 2012), "undermine" (Mazoue, 2013), "destroy"

(Harden, 2013), "fragment" (Irvine et al., 2013), and replace conventional higher education models. Disruptive technologies pose a danger to higher education leaders in the current education marketplaces because they can make them change how they operate. This transformation may be so disruptive that they will lose their jobs. This "disruption" to the existing higher education model, according to Yuan and Powell (2013a, 2013b) and Mazoue (2013), is fundamentally a challenge to its pricey business strategy. Some institutions have begun to respond to this notion by adding MOOC courses into their conventional programs, for example. To offer courses, Ivy League universities like Stanford, Penn, Princeton, Harvard, MIT, and others now work with MOOC providers like Coursera, edX, and Udacity (Carr, 2012). The experimentation with MOOCs is still in its early stages, and several obvious issues need continued attention, such as proper course organization and management, venture investment, and funding to assure financial viability and recognition (Milheim, 2013). Universities offering MOOCs often require evidence that their continuing support for MOOC production aligns with current institutional strategic goals (Deng, et al., 2020). Understanding the differences in learner motivations to enrol in a course necessitates careful consideration of learner experiences within MOOCs (Moore, et al., 2022) Institutions that offer blended MOOCs should prioritise creating a good learning environment that encourages peer-to-peer learning, teamwork, idea sharing, and getting feedback from instructors and other students (Edumadze & Govender, 2024)

Research Questions

1. What are the key factors that influence learners' decision to choose specific MOOC courses?
2. What are the dependent and linking variables to remain attractive for the learners?

Research Methodology

Statistical Tool

Interpretive structural modelling (ISM) analyses complex systems, identifies their parts, and examines their interactions. It aids decision-making and may reveal the hierarchical links between Variables. It incorporates problem identification, system definition, and reachability matrix creation. The reachability digraph, a graphical depiction of the system's hierarchy, is derived from the reachability matrix. Identifying the system's drivers and dependents follows the reachability digraph. These components strongly impact others and are strongly influenced by others. Recognizing system component impact levels completes the structural model. The structural model shows the hierarchical links between system components and helps explain system dynamics and interdependencies. It helps analyse complex systems, identify drivers and relationships, and inform decision-making. It helps communicate complicated concepts and facilitate collaborative decision-making by visualizing system linkages.

Data collection

Qualitative data were acquired for the research. Information was obtained via literature study as well as current trends and patterns that the observed among the different types of Learners. Ten factors were chosen for examination, and they are listed below.

1. Curiosity to Learn
2. Reputation of platform
3. Flexibility and Access to contents
4. Intention to Updated

5. Credit Transfer
6. Eagerness to expand Knowledge
7. Certificate
8. Job Prospect
9. Assistance from University / College
10. Mentor Mentee support

Results, Analysis and Discussions

Structural self-interaction matrix

The SSIM is formulated after the identification of variables that are pertinent to the problem at hand, which can be seen in Figure 1. There exist four potential relationships among the factors, which have been assigned the following codes:

If "row" variable is leading to "column" variable = V

If the "column" variable leads to the "row" variable = A

If both the "row" and "column" variables leading to each other = X

If there is no relationship between the "row" and "column" variables = O

Figure-1: Structural Self-Interaction Matrix

Variables	1	2	3	4	5	6	7	8	9	10
Curiosity to Learn		V	V	X	X	V	V	V	V	V
Reputation of platform			V	V	V	V	V	V	O	O
Eagerness to expand Knowledge				A	O	A	V	A	V	V
Flexibility and Access to contents					A	V	V	V	O	V
Intention to Updated						V	V	V	V	V
Credit Transfer							V	V	V	V
Certificate								A	V	A
Job Prospect									A	A
Assistance from University / College										A
Mentor Mentee support										

Figure-2: Reachability Matrix

Variables	1	2	3	4	5	6	7	8	9	10	Driving Power
Curiosity to Learn	1	1	1	1	1	1	1	1	1	1	10
Reputation of platform	0	1	1	1	1	1	1	1	0	0	7
Eagerness to expand Knowledge	0	0	1	0	0	0	1	0	1	1	4
Flexibility and Access to contents	1	0	1	1	0	1	1	1	0	1	7
Intention to Updated	1	0	0	1	1	1	1	1	1	1	8
Credit Transfer	0	0	1	0	0	1	1	1	1	1	6
Certificate	0	0	0	0	0	0	1	0	1	0	2
Job Prospect	0	0	1	0	0	0	1	1	0	0	3
Assistance from University / College	0	0	0	0	0	0	0	1	1	0	2
Mentor Mentee support	0	0	0	0	0	0	1	1	1	1	4
Dependence Power	3	2	6	4	3	5	9	8	7	6	

Reachability Matrix

Figure 2 displays the assessment of the obtained RM for its transitivity. As a mathematical concept, transitivity asserts that the rows and columns of a specific matrix represent subnets, where every cell indicates the row subnet's ability to access the column subnet. Before iteration, it was discovered that the curiosity to learn holds the most significant driving power, while assistance has the least driving power. Certificates have the highest dependence power, while reputation has the lowest dependence power.

Final Reachability Matrix

The Final Reachability Matrix, depicted in Figure 3, is a tool used to evaluate the impact and interconnectivity of technology in education. It measures the driving power and dependence of each variable, which refers to the number of variables that can be used to achieve a specific objective and the number of variables that contribute to its achievement, respectively. Upon iteration, the variables with the highest driving power were found to be learning curiosity, reputation, flexibility, and intention to update, while eagerness, certification, job prospects, assistance, and mentor-mentee support exhibited the highest dependent power. This information provides insight into the connections between the variables.

Figure-3: Final Reachability Matrix

Variables	1	2	3	4	5	6	7	8	9	10	Driving Power
Curiosity to Learn	1	1	1	1	1	1	1	1	1	1	10
Reputation of platform	1*	1	1	1	1	1	1	1	1*	1*	10
Eagerness to expand Knowledge	0	0	1	0	0	0	1	1*	1	1	5
Flexibility and Access to contents	1	1*	1	1	1*	1	1	1	1*	1	10
Intention to Updated	1	1*	1*	1	1	1	1	1	1	1	10
Credit Transfer	0	0	1	0	0	1	1	1	1	1	6
Certificate	0	0	1*	0	0	0	1	1*	1	1*	5
Job Prospect	0	0	1	0	0	0	1	1	1*	1*	5
Assistance from University / College	0	0	1*	0	0	0	1*	1	1	1*	5
Mentor Mentee support	0	0	1*	0	0	0	1	1	1	1	5
Dependence Power	4	4	10	4	4	5	10	10	10	10	

Figure-4: Level Partitioning and Conical Matrix

Level Partitioning(LP)				
Elements(Mi)	Reachability Set R(Mi)	Antecedent Set A(Ni)	Intersection Set R(Mi)∩A(Ni)	Level
1	1, 2, 4, 5,	1, 2, 4, 5,	1, 2, 4, 5,	3
2	1, 2, 4, 5,	1, 2, 4, 5,	1, 2, 4, 5,	3
3	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
4	1, 2, 4, 5,	1, 2, 4, 5,	1, 2, 4, 5,	3
5	1, 2, 4, 5,	1, 2, 4, 5,	1, 2, 4, 5,	3
6	6,	1, 2, 4, 5, 6,	6,	2
7	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
8	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
9	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
10	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1

Level Partitioning Iterations

Elements(Mi)	Reachability Set R(Mi)	Antecedent Set A(Ni)	Intersection Set R(Mi)∩A(Ni)	Level
1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	1, 2, 4, 5,	1, 2, 4, 5,	
2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	1, 2, 4, 5,	1, 2, 4, 5,	
3	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
4	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	1, 2, 4, 5,	1, 2, 4, 5,	
5	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	1, 2, 4, 5,	1, 2, 4, 5,	
6	3, 6, 7, 8, 9, 10,	1, 2, 4, 5, 6,	6,	
7	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
8	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
9	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
10	3, 7, 8, 9, 10,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,	3, 7, 8, 9, 10,	1
1 2 3				

Conical Matrix(CM)

Variables	3	7	8	9	10	6	1	2	4	5	Driving Power	Level
3	1	1	1*	1	1	0	0	0	0	0	5	1
7	1*	1	1*	1	1*	0	0	0	0	0	5	1
8	1	1	1	1*	1*	0	0	0	0	0	5	1
9	1*	1*	1	1	1*	0	0	0	0	0	5	1
10	1*	1	1	1	1	0	0	0	0	0	5	1
6	1	1	1	1	1	1	0	0	0	0	6	2
1	1	1	1	1	1	1	1	1	1	1	10	3
2	1	1	1	1*	1*	1	1*	1	1	1	10	3
4	1	1	1	1*	1	1	1	1*	1	1*	10	3
5	1*	1	1	1	1	1	1	1*	1	1	10	3
Dependence Power	10	10	10	10	10	5	4	4	4	4		
Level	1	1	1	1	1	2	3	3	3	3		

Reduced Conical Matrix(CM)

Variables	3	7	8	9	10	6	1	2	4	5	Driving Power	Level
Eagerness to expand Knowledge	1	1	1*	1	1	0	0	0	0	0	5	1
Certificate	1*	1	1*	1	1*	0	0	0	0	0	5	1
Job Prospect	1	1	1	1*	1*	0	0	0	0	0	5	1
Assistance from University / College	1*	1*	1	1	1*	0	0	0	0	0	5	1
Mentor Mentee support	1*	1	1	1	1	0	0	0	0	0	5	1
Credit Transfer	1	1	1	1	1	1	0	0	0	0	6	2
Curiosity to Learn	0	0	0	0	0	1	1	1	1	1	10	3
Reputation of platform	0	0	0	0	0	1	1*	1	1	1	10	3
Flexibility and Access to contents	0	0	0	0	0	1	1	1*	1	1*	10	3

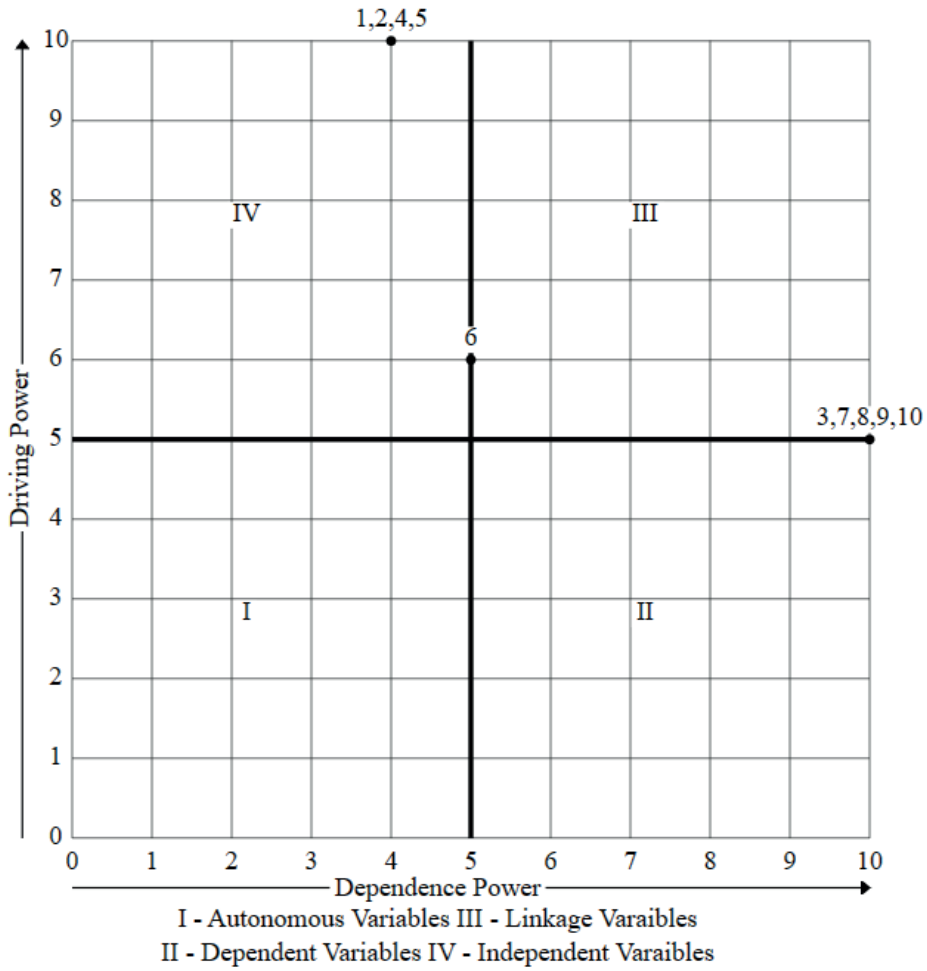
Level Partitioning

The LP and conical matrix indicate that the variables are partitioned differently, aiding in Micmac analysis and the creation of the final model. This process establishes connections between the variables, leading to the identification of linking variables that connect the dependent variable to its independent counterparts.

MICMAC Analysis

In the field of study, there are four types of variables with varying levels of influence and dependence. Autonomous variables have minimal driving power and are not connected to the structure. Dependent variables have low causative influence but rely heavily on other variables. Linkage variables have a strong impact and react to the variables in the system. Independent variables have significant driving forces and minimal interdependence. The fourth quadrant of the study focuses on independent variables, including learning curiosity, reputation, flexibility, and intention to update. These variables are crucial factors in the study. Additionally, the study considers credit transfer as a linkage variable, as shown in Figure 5.

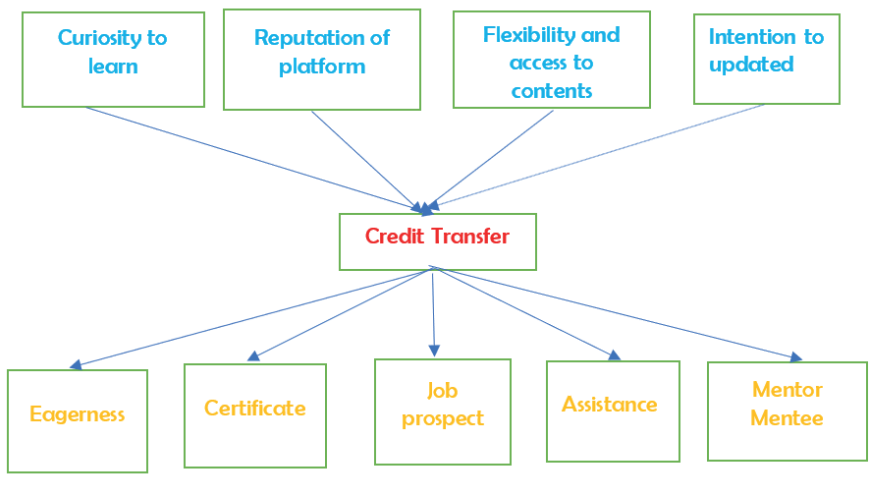
Figure-5: MICMAC Analysis



Final Model

The final model shows that learning curiosity, reputation, flexibility, and intention to update are significant variables in the top-level model, as illustrated in Figure 6. These variables can catalyze other parties to achieve their goals. They are independent factors that can influence other variables under investigation. India, as a developing economy, has witnessed remarkable technological advances and automation in education in recent years. The rapid growth of technology has positively impacted education by making learning available 24/7 to people. The variables at the bottom of the model, including eagerness, certification, job prospects, assistance, and mentor-mentee support, are dependent variables with no driving power.

Figure-6: Final Model



Conclusion & Suggestions

Conclusion

When it comes to MOOC learning design, the focus tends to be on individualized learning rather than collaborative learning. This is because managing the diverse range of people who form networked learning communities can be difficult. As a result, there is limited experience in using ICT to create new pedagogical models. However, despite using a traditional approach, there are still elements in their pedagogical discourses that contradict this perspective by emphasizing teaching centred on the student's learning process. This shows their effort to adapt to the current reality and is consistent with their innovative background. Variables such as curiosity, reputation, flexibility, and intention play a crucial role in driving other variables in the final model. The certificate is a crucial link between the independent and dependent variables. The study's dependent variables include credit transfer, assistance, mentor-mentee support, job prospects, and eagerness.

Implications

It is essential for educational institutions to take into account several key factors when developing MOOC (Massive Open Online Course) offerings. By doing so, they can significantly enhance learner engagement and foster genuine curiosity in individuals who seek to improve their skills. One of the most influential elements is the concept of credit transfer. This particular aspect

plays a crucial role in shaping the interest of a diverse range of learners in MOOCs, especially in light of the new education policy. Under this policy, learners have the opportunity to earn credits that can be captured and reflected in their Academic Bank of Credits. This system not only incentivizes participation but also underscores the value of continuous learning and skill development in today's educational landscape.

Limitations

In conducting the study, we had to narrow our focus to only ten variables and disregard all other variables. It is one of the limitations of our research. We utilized interpretive structural modelling as a research technique to analyze the relationships between the variables. However, other research techniques also focus on model building and the significance of the models. We chose interpretive structural modelling because it is specifically designed to examine the relationships between the variables.

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