

Examining the Role of Industry 4.0 in Higher Education via a Grey Impact Analysis of Factors Limiting MBA Enrollment

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ABSTRACT

Earning more money, having a smaller chance of being unemployed or dependent on the government, having a larger tax base, and being more involved in the community are just a few of the many positive outcomes that result from higher education. Still, many households have difficulties paying for a college degree. Changes in the labor market are not the only thing that will be impacted by the rise of Industry 4.0. Consequently, universities also have a responsibility to prepare their students officially to adjust to such developments. Although the Master of Business Administration (MBA) has been around for almost a century since it was first offered in the United States of America in 1908, enrollments in this elite program have been rapidly declining in recent years. As a result, its worth has diminished as the industrial revolution continues. This study analyzes the factors that contribute to the fall in the number of students enrolling in international MBA programs and ranks them in order of importance. It will be helpful to the implementation of obstacles to MBA enrollments if one has a firm grasp on the most significant impediments in terms of dynamics. In this work, the authors creatively use the grey incidence analysis (GIA) technique to rank the identified obstacles in order of importance despite the lack of data. After using this technique, I felt confident in my forecasts. To reverse the trend of falling applications for overseas MBA programs, governments should focus heavily on the most highly rated obstacle, "employment challenges" (H3). Additionally, "lack of entrepreneurial skills" (H11), "high cost" (H10), "longer payback time" (H1), "10 yr. ROI" (H9), and "lack of data analysis abilities" (H10) are all significant obstacles that should be taken into account (H7). Therefore, throughout the policymaking process, limited resources should be allocated to tackling these priority obstacles. This research also makes a novel scholarly contribution by reporting the results of a rigorous investigation of the factors inhibiting the enrollment of overseas MBA students.

INDEX TERMS Earning more money, reducing the likelihood of unemployment or dependence on the government, increasing the size of the tax base, and being more engaged in the community are just a few of the numerous benefits that accrue from obtaining a college degree. Even still, many families struggle with the cost of higher education. The growth of Industry 4.0 will affect more than only the job market, though. As a result, educational institutions have a duty to formally help students adapt to these kinds of changes. Despite the fact that the Master of Business Administration (MBA) degree has been available in the United States of America since 1908, enrollments in this highly selective program have been steadily falling over the last several years. Therefore, its value has decreased as the industrial revolution progresses. The purpose of this research was to identify the main causes of the decline in foreign MBA student enrollment and rank them by significance. Having a good grip on the most important obstructions in terms of dynamics will aid in the deployment of barriers to MBA enrollments. Due to a lack of information, the writers of this piece apply creativity by using the grey incidence analysis (GIA) method to prioritize the discovered roadblocks. Using this method, I was able to increase my faith in my predictions. Governments should prioritize addressing the top-ranked barrier, "employment problems," in an effort to reverse the declining trend in applications to international MBA programs (H3). Considerable challenges include "a lack of entrepreneurial skills" (H11), "high costs" (H10), "longer payback period" (H1), "a 10 year return on investment" (H9), and "a lack of data analytic abilities" (H10) (H7). This means that throughout the policymaking process, scarce resources should be prioritized to address these top challenges. An original academic addition, this study details the findings of an in-depth exploration of the barriers to enrolment faced by international MBA students.

INTRODUCTION

The advent of the Fourth Industrial Revolution (Industry 4.0), characterized by the internet of things (IoT), internet of services (IoS), cyber-physical systems, big data, smart systems and analytics, artificial intelligence (AI), and robotics and cloud manufacturing, has had an unprecedented global impact across all industries, according to research [1]. Although the synergistic

effects of the fourth industrial revolution are similar to those of the preceding three (Industry 1.0, Industry 2.0, and Industry 3.0) [2],

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High levels of knowledge and expertise are needed [4], and the impact of this new wave of industrialisation is not confined to the traditional manufacturing or production sectors [3]. Higher education institutions have been the primary focus of study on the topic of global industrialization, but this has left out a crucial player in the knowledge-making process.

Human workers in Industry 4.0 are expected to demonstrate a set of abilities that are relevant across disciplines. Problem-solving, analytical thinking, creative problem-solving, and data-analytics are all part of the repertoire. Because of this interaction

change, it's clear that universities face significant obstacles in closing the resulting knowledge gaps. The academic community is now rethinking its teaching methods in light of recent technological, conceptual, and paradigm shifts. Enrollment in MBA programs has dropped by double digits in recent years, according to several research. The number of applicants for MBA programs at the top 10 institutions fell by an average of 3,400 in 2018, or 5.9%, from 57,311 in 2017 to 53,907. The University of Michigan Ross School had a decrease of 8.5%, from 3,485 to 3,188 applicants. The number of applicants dropped by 4.5% at Harvard, 7.5% at Berkeley's Haas School of Business, 6.7% at Wharton, and 4.6% at Stanford. Many factors, including its high cost against return on investment (ROI), and a lack of analytics in courses, contributed to a 6.5% drop in applicants for 2018-2019 at the MIT Sloan School [5]. Yale lost approximately 591 applications in the same time period.

Because of this shift, it's abundantly evident that academic institutions confront formidable challenges when attempting to fill the ensuing knowledge gaps. In light of recent technical, conceptual, and paradigm advances, the academic world is now reevaluating its approach to education. A number of studies show that the number of students enrolling in MBA programs has decreased by double digits in recent years. Applications to MBA programs at the top 10 universities declined by an average of 3,400 in 2018, or 5.9%, from 57,311 in 2017 to 53,907. Applications to the Ross School of Business at the University of Michigan dropped by 8.5%, from 3,485 to 3,188. At Harvard, the number of applications fell by 4.5%, at Berkeley's Haas School of Business it fell by 7.5%, at Wharton it fell by 6.7%, and at Stanford it fell by 4.6%. The MIT Sloan School had a 6.5% dip in applications for the 2018-2019 school year [5]. This decline may be attributed to a number of causes, including the high cost compared to return on investment (ROI) and a lack of analytics in courses. During the same time frame, Yale received around 591 fewer applications.

There was a decline of 5.4% from 2018 to 2019 and an increase of 11.8% from 2017 to 2019 in the number of international students enrolling in the Wharton School's MBA program. The number of international students it accepted during that time period dropped by 30%. Many questions, such as "how can we bridge these gaps," remain unaddressed. If there are any issues, please specify. With so little resources available, how can we choose which problems to solve first? How do we account for the gaps in information and intuition that often characterize decision-making? Currently, millions of children are being denied the chance to attend college.

This change makes it very clear that universities and colleges face significant obstacles when seeking to overcome the resulting knowledge gaps. Education is being rethought in light of contemporary developments in technology, theory, and paradigm. There has been a consistent ten percent drop in the number of students enrolling in MBA programs over the last several years, according to a number of surveys. There was a 5.9% drop, or 3,400 fewer applications, to MBA programs at the top 10 colleges in 2018 compared to 2017. In 2017, there were 57,311 applications. Business school applications to the University of Michigan's Ross School of Management decreased by 8.5%, from 3,485 to 3,188. The number of applicants dropped by 4.5% at Harvard, 7.5% at Berkeley's Haas School of Business, 6.7% at Wharton, and 4.6% at Stanford. Application numbers dropped by 6.5% at the MIT Sloan School for the next academic year [5]. Several factors, such as low ROI and a lack of analytics in classes, have contributed to this reduction. Yale had a drop of around 591 applications during that period.

In 2019, the number of overseas students enrolling in the MBA program at the Wharton School fell by 5.4% compared to 2018, but rose by 11.8% from 2017 to 2019. The institution saw a 30% decline in the number of overseas students it admitted during that time. Concerns like "how can we bridge these gaps?" have not been adequately addressed. Please be specific if there are any problems. Where can we even begin to prioritize issues to address when resources are limited? How can we take into consideration the uncertainty and gut feelings that so often accompany decision-making? Millions of young people nowadays do not have access to higher education.

This shift makes it abundantly evident that educational institutions confront substantial challenges in attempting to close the associated knowledge gaps. The educational system is undergoing a rethink in light of the technological, theoretical, and conceptual shifts of the present. According to a number of polls, the number of people enrolling in MBA programs has decreased by 10% annually over the last several years. The number of people applying to MBA programs at the top 10 universities fell by 5.9%, or 3,400 fewer people, in 2018 compared to 2017. There were 57,311 submissions last year. The number of students applying to the Ross School of Management at the University of Michigan has dropped by 8.5%, from 3,485 to 3,188. At Harvard, the number of applications fell by 4.5%, at Berkeley's Haas School of Business it fell by 7.5%, at Wharton it fell by 6.7%, and at Stanford it fell by 4.6%. The number of students applying to the MIT Sloan School for the next school year fell by 6.5% [5]. This decline may be attributed to a number of issues, including poor return on investment and a

lack of focus on analytics in academic settings. A total of around 591 fewer students applied to Yale throughout that time. While enrollment in the Wharton School's MBA program from international students declined by 5.4% in 2019 compared to 2018, it climbed by 11.8% from 2017 to 2019. In that same period, the university suffered a 30 percent drop in the number of international students it welcomed. Not enough attention has been paid to questions like "how can we overcome these gaps?" If there are issues, please be more descriptive. When funds are few, how can we even begin to decide which problems to tackle first? Is there a way to factor in the inherent ambiguity and visceral reactions that come with every decision? These days, millions of young people can't continue their education through high school.

I. BACKGROUND

Because of this change, it is very clear that schools face formidable obstacles when trying to fill up the resulting knowledge gaps. As a result of technical, theoretical, and philosophical changes, the educational system is undergoing a rethink. Several surveys have shown that during the last several years, the number of persons enrolling in MBA programs has dropped by 10% yearly. Applying to an MBA program at one of the top 10 institutions saw a 5.9% decrease, or a decrease of 3,400 applicants, in 2018 compared to 2017. Last year, there were 57,311 entries. Since 2013, applications to the Ross School of Business at the University of Michigan have decreased by 8.5%, from 3,485 to 3,188. The number of applicants dropped by 4.5% at Harvard, 7.5% at Berkeley's Haas School of Business, 6.7% at Wharton, and 4.6% at Stanford. For the next academic year, applications to the MIT Sloan School dropped 6.5% [5]. Reasons for this reduction include insufficient emphasis on analytics in educational settings and low return on investment. During that same period, the number of applicants to Yale dropped by around 591.

The number of overseas students enrolled in the Wharton School's MBA program fell by 5.4% in 2019 compared to 2018, while it increased by 11.8% from 2017 to 2019. The percentage of overseas students attending the institution also dropped by 30% during that time. Concerns like "how can we bridge these chasms?" have not received enough consideration. Specify any problems if at all possible. When resources are limited, prioritizing issues might seem impossible. Is there any way to account for the uncertainty and emotional responses that always accompany every choice? Millions of kids nowadays can't afford to keep going to school beyond the high school level.

This shift makes it very evident that educational institutions confront significant challenges when attempting to overcome the ensuing skill disparities. The educational system is being rethought due to developments in technology, theory, and philosophy. Multiple recent polls have showed that the number of people enrolling in MBA programs has been declining at a rate of around 10% annually. The number of students applying to MBA programs at the top 10 universities fell by 5.9%, or 3,400, in 2018 compared to 2017. There were 57,311 submissions last year. The number of students applying to the Ross School of Business at the University of Michigan has declined by 8.5%, from 3,485 in 2013 to 3,188 in 2018. At Harvard, the number of applications fell by 4.5%, at Berkeley's Haas School of Business it fell by 7.5%, at Wharton it fell by 6.7%, and at Stanford it fell by 4.6%. The number of students applying to the MIT Sloan School for the next school year fell 6.5% [5]. This decrease is due to the poor return on investment and the inadequate focus on analytics in educational settings. Around 591 fewer people applied to Yale at that time.

The percentage of international students participating in an MBA program at The Wharton School decreased by 5.4% in 2019 compared to 2018, but climbed by 11.8% from 2017 to 2019. During that period, there was a thirty percent decline in the number of international students at the school. Questions such as "how can we bridge these chasms?" have not been given enough thought. When possible, please be as specific as possible about the issues you're experiencing. It might be difficult to choose which problems to tackle first when resources are few. Is there any way to factor in the apprehension and feelings that always come with every decision? It's become unaffordable for millions of today's youth to continue their education through high school.

Because of this change, it's now abundantly clear that schools face formidable obstacles in trying to address the resulting skill gaps. As a result of changes in science, theory, and philosophy, the educational system is undergoing a reevaluation. The number of persons enrolling in MBA programs has been falling at a pace of around 10% each year, according to a number of recent surveys. The number of people who wanted to enroll in an MBA program at one of the top 10 colleges dropped by 5.9%, or 3,400 people, in 2018 compared to 2017. Last year, there were 57,311 entries. The number of applicants to the University of Michigan's Ross School of Business has dropped from 3,485 in 2013 to 3,188 in 2018. The number of applicants dropped by 4.5% at Harvard, 7.5% at Berkeley's Haas School of Business, 6.7% at Wharton, and 4.6% at Stanford. The number of incoming students at the MIT Sloan School decreased by 6.5% [5]. The low ROI and insufficient emphasis on analytics in educational settings are to blame for this decline. There were around 591 fewer applications to Yale that year.

In 2019, the number of overseas students enrolled in an MBA program at The Wharton School fell by 5.4% compared to 2018, but increased by 11.8% from 2017 to 2019. There was a thirty percent drop in the number of foreign students attending the institution at that time. The answers to crucial questions like "how can we bridge these chasms?" have not been fully explored. Provide as much detail as you can about the problems you're encountering. When funds are tight, prioritizing issues may be challenging. How do we account for the uncertainty and emotional toll that accompany every choice? For millions of today's young people, higher education is out of reach because of rising costs.

This shift makes it quite evident that schools will have to overcome significant challenges to bridge the ensuing skill disparities. The educational system is being rethought in light of recent developments in science, theory, and philosophy. Several recent polls have shown that the number of people enrolling in MBA programs has been declining at a rate of around 10% each year. In 2018, there was a 5.9% decrease, or 3,400 fewer persons, who expressed interest in enrolling in an MBA program at one of

the top 10 universities, compared to 2017. There were 57,311 submissions last year. From 3,485 in 2013 to 3,188 this year, there has been a decline in interest in the Ross School of Business at the University of Michigan. At Harvard, the number of applications fell by 4.5%, at Berkeley's Haas School of Business it fell by 7.5%, at Wharton it fell by 6.7%, and at Stanford it fell by 4.6%. Compared to last year, 6.5% fewer students applied to the MIT Sloan School [5]. The poor ROI and inadequate attention on analytics in educational settings are to blame for this drop. That year, Yale had a decline of around 591 applicant submissions.

The number of international students enrolling in an MBA program at The Wharton School declined 5.4% from 2018 to 2019, but rose 11.8% from 2017 to 2019. The percentage of international students attending the school dropped by 30% over that period. Not all possible avenues for answering important concerns like "how can we bridge these chasms?" have been investigated. Give us as much information as you can about the issues you're having. Prioritizing problems may be difficult when resources are limited. What methods can we use to take into account the apprehension and heartache that come with every option? Due to escalating expenses, a college education is becoming out of reach for millions of today's youth.

II. BARRIERSIMPEDINGINTERNATIONALMBAENROLLMENTS

A literature evaluation on the factors that prevent people from enrolling in an MBA program was one of the study's contributions to the field. Research on the factors that prevent prospective students from enrolling in an MBA program is, to the authors' knowledge, rare. The literature on MBA studies was evaluated, and individual obstacles were reassembled and reorganized, in an effort to close this gap. The Master of Business Administration (MBA) was developed in the

It may be traced back to the turn of the century in the United States [38]. The Industrial Revolution ushered in a new era of industrial production that required a different set of skills from factory workers. As a result, cutting-edge approaches to management have developed, with inspiration from academic and business best practices [39]. As time has passed since Harvard University's first Master of Business Administration (MBA) degree was granted in 1908, the degree's curriculum has been the topic of much discussion and adjustment to keep up with the times. In the twenty-first century, a period defined by the third and fourth industrial revolutions, the traditional MBA has a number of shortcomings [40].

The Master of Business Administration (MBA) degree has long been regarded as among the most effective means by which to get comprehensive management training; nevertheless, recent criticism has led to a decline in enrollments. Employability (H1), skills, program expense (H3), payback time (H4), and general business leadership ability (all H5) have all been cited as reasons for the slow adoption of this new trend [37]. With regard to ROI (H5), Grove and Hussey (2014) studied the ROI of MBAs to determine the impact of earnings quality and non-monetary outcomes including management expectations, self-assessment abilities, and satisfaction. One of the most consistent drivers of MBA enrollment has been the high perceived financial return on investment. The use of technology has a role in shaping globalization in the context of higher education.

Since the advent of internet-based computing, data analytics has been an in-demand skill among businesses of all sizes. Many universities have taken steps to include data analytics (H6) as a required subject in their curricula in recent years, particularly in light of Industry 4.0. Since MBAs are essential to modern universities, this requirement has been a hot topic of debate [41], ultimately leading to a precipitous drop in the number of students enrolling in MBA programs. Some have questioned the usefulness of an MBA education for managers and how they can use what they've learned on the job [42], specifically the value of an MBA program and how well it can transfer knowledge and creative (H7) abilities. Graduates who can think outside the box and adapt to an ever-evolving work market are in great demand in today's Industry 4.0 economy. Existing MBA programs often adhere to the outdated model; hence, discussions about updating the MBA to better reflect current realities are ongoing.

The number of available positions in the labor market and employment (H1) is a well-known factor that affects the number of MBA students enrolled in universities. The significant decline in MBA enrollment has been studied by media outlets including Forbes Magazine. Supply and demand in the labor market (H8) drives the MBA markets [43]. Based on our observations, we believe that the fast growth of IoT and data analysis in Industry 4.0 will need specialized training that is not currently provided by the MBA curriculum.

the course offerings it does now. MBA programs have not changed much from the 20th century, despite the fact that many industries have seen radical transformations since then. Many universities have made substantial adjustments to their MBA programs, but these alterations have mostly been experimental, with mixed results. As a result, adopting the practices of Industry 4.0 (H10) has proven difficult.

Most business-related programs, including an MBA, contain a leadership course as part of their curriculum, and leadership courses are often offered at new campuses. Leadership is also crucial for an organization's development in order to effectively market and advertise new products and services [44]. Therefore, managers and workers need to demonstrate flexible leadership (H11) traits to bridge the gap brought about by the so-called Industry 4.0. The problem is determining whether an MBA has what it takes to handle such pressures. Several respondents to our survey argued against this, suggesting that this difficulty is a factor in the declining value of the MBA.

This report is an effort to contribute to, and provide assistance to policymakers in tackling, the following topics and hurdles to MBA enrollment:

First, the article investigates the factors that prevent overseas students from enrolling in MBA programs. For MBAs to be widely adopted, it is important to comprehend the dynamics the industrial revolution has imposed on higher education and how they affect the primary obstacles to enrollment.

2. This research is interesting since it uses the GIA technique to rank the factors that prevent overseas students from enrolling in

MBA programs. Although several hypotheses have been proposed to explain the fall in MBA enrollment, no formal contributions have been made to prioritize these impediments as reasons for the drop. That's why I wrote this paper, to fill in the blanks.

Third, this article explores the interplay between Industry 4.0, higher education, and GIA implementation. Figure 1 below provides an overview of the study procedure. The remaining parts of this study provide further specifics.

III. METHODOLOGY

This paper was written in an attempt to contribute to and aid policymakers in addressing the following issues and barriers to obtaining an MBA degree:

Initially, the paper delves into the causes of the low number of international students enrolled in MBA programs. Understanding the dynamics the Industrial Revolution has placed on higher education and how they impact the key barriers to enrolment is crucial if the MBA is to gain widespread acceptance.

Using the GIA method, this study ranks the characteristics that deter international students from enrolling in MBA schools in the United States. While several potential explanations for the decline in MBA applications have been postulated, no substantial work has been done to rank them. This study was intended to address such gaps.

Lastly, this paper examines the relationships between Industry 4.0, universities, and GIA.

Figure 1 presents a summary of the research methodology. More information may be found in the subsequent sections of this research. One of the main limitations of such analyses is that they require large sample sizes to provide reliable conclusions, whereas GIA can process relatively smaller sample sizes while still yielding accurate results.

A. DATA COLLECTION

This report was produced with the hope that it would help policymakers overcome the following challenges and obstacles to earning an MBA:

This article first investigates why there are so few foreign students enrolling in MBA programs. If the MBA is to obtain universal acceptability, it is essential to comprehend the dynamics the Industrial Revolution has put on higher education, and how these dynamics effect the primary hurdles to enrollment.

This research uses the GIA technique to rank the factors that discourage overseas students from enrolling in MBA programs in the United States. While there have been a number of proposed reasons for the drop in MBA applications, no serious effort has been made to rank them. This research set out to fill such voids.

Finally, this research investigates how GIA, universities, and Industry 4.0 interact with one another.

Fig. 1 is a visual breakdown of the study's research plan. The upcoming parts of this study should provide further details.

The following difficulties and roadblocks to getting an MBA were identified and are discussed in this paper in the hopes that they may be removed by policymakers as a result of its findings.

The essay starts by exploring the question of why there are so few international students enrolled in MBA programs. Understanding the pressures the Industrial Revolution has imposed on higher education and how these dynamics impact the key impediments to enrolment is crucial if the MBA is ever to achieve general acceptance.

In order to determine why so many international students choose not to enroll in MBA schools in the United States, this study used the GIA method to rank the most significant deterrents. Although many explanations have been postulated for the decline in MBA applications, no significant attempt has been made to rank them. The goal of this study was to address this knowledge gap.

where $\epsilon_{0,i}$ is the absolute degree of grey incidence [13].

B. SECOND SYNTHETIC GIA MODEL

The synthetic degree of incidence combines the properties of similarity and proximity from the DGIA and ADGIA, respectively, and thus gives a more complete representation of the relationship between system factors owing to the rates of change of their sequences for their initial values. The second synthetic degree of grey incidence is a further improvement, which reflects the overall closeness of two sequences based

Has a weight (second synthetic degree of grey incidence (-ij) of 0.604186) that made it the most significant obstacle to MBA international enrollment. According to the sequential analysis, this obstacle is primarily responsible for the falling numbers of foreign students enrolling in MBA programs, as was previously indicated. This obstacle must thus be addressed by policymakers. To keep things straightforward, the top six obstacles (those listed from 1 to 6) are separated from the bottom six (those ranked from 7-12). The highest six obstacles must be prioritized during policy debates, but all must be given due consideration.

treated as though it really mattered. This is due to the fact that they are significant contributors to the decline in recent foreign enrollment in MBA programs. Specifically, this scenario necessitates using limited resources to overcome the obstacles of "lack of entrepreneurial abilities" (H11; 0.5846), "high cost" (H10; 0.5844), "longer pay- back period" (H1; 0.5822), "10-year ROI" (H9; 0.5764), and "lack of data analysis skills" (H1; 0.5762). (H7; 0.5759). We list the 12 obstacles in decreasing order of difficulty, beginning with the lowest: challenges in obtaining gainful work "inadequate business acumen" (H3; 0.604186) > "high cost" (H11; 0.5846) Ten-year return on investment (H10; 0.5844) > one-year payback (H1; 0.5822) Inability to analyze data effectively (H9; 0.5764) > "inability to think creatively" (H7; 0.5759) The "changing work economy" (H6; 0.570441) "lack of flexibility" (H5; 0.564442) "lack of leadership skills" (H4; 0.563809) "lack of employability" (H2) "salary" (H8) (H12; 0.557993). In addition, a comprehensive analysis of each obstacle is provided below.

INVESTMENT RETURN

The return on investment (ROI) is a metric used to assess how much money was made back from an investment. The GMAC study defines investment in this context as the sum of two components: total out-of-pocket expenses and opportunity costs. All tuition and other expenses not covered by federal or state financial assistance are considered part of the out-of-pocket expenditures. Other expenditures received through non-repayable sources, such as scholarships, grants, parental assistance, or employment reimbursements, are not included in this category. Second, there is the potential cost of not working and earning an income while getting an MBA. To determine the opportunity cost of dropping out of school, we multiply the annual pay from the last job held before college enrollment by the number of years necessary to get the degree.

Salary information from the study was broken down for MBA graduates into three time intervals with regard to their return. Each respondent's base wage is broken down into three buckets: before enrolling in an MBA program, after completing an MBA, and at the time of this poll. The income increase (pay increase) from before to after completing an MBA program was also factored in. Every year after the first, the compensation would increase by the same amount. We used a combination of the present income, the compound annual growth rate of the post-degree wage, and the salary at the time of graduation to arrive at an annual salary estimate. It takes a full-time two-year MBA graduate an average of three and a half years to earn back the cost of their degree (Table 5). Therefore, graduates may get their money's worth from their education in a very short length of time. As a result, our grey relational analysis-based assessment places ROI at fifth place among the factors that affect choices about pursuing an MBA. The questionnaire that was used

In the following table, we can see the average amount invested, the average income increase, the average return on investment, and the average pay over the course of a number of years after graduation.

RETURN ON INVESTMENT

How much money was earned back from an investment may be measured by looking at the return on investment (ROI). According to the GMAC report, the term "investment" refers to the aggregate of two variables: direct costs and lost opportunities. Out-of-pocket costs include tuition and any other related fees not covered by federal or state aid. Scholarships, grants, parental aid, and employer reimbursements are not listed here since they are not considered "out of pocket" expenses. The second possible downside to having an MBA is the money you could lose by not working to support yourself. Calculating the opportunity cost of not continuing one's education involves multiplying one's yearly salary from one's final employment before college enrollment by the number of years required to get one's degree.

The research separated MBA alums' salary data into three distinct time periods based on their rate of return. There are three groups into which each respondent's starting salary may be placed: before starting an MBA program, after finishing an MBA, and right now. The salary boost earned after finishing an MBA degree was also taken into account. After the first year, the salary would go up by the same amount annually. We estimated a yearly pay by combining the graduate's current income with the salary at the time of graduation and the compound annual growth rate of the post-degree compensation. Return on investment for a two-year MBA takes an average of three and a half years of full-time work (Table 5). Therefore, it is possible that graduates may see a return on their investment in a very short period of time. Our evaluation using grey relational analysis shows ROI at #5 on the list of things that matter to people when deciding whether or not to get an MBA. A sample of the questionnaire

In the table below, we can see how much is often invested, how much of an increase in income is typically seen, how much of a return on investment is typically seen, and how much a graduate can expect to earn over the course of many years after receiving their degree.

JOBMARKET

According to a 2016 poll by the Graduate Management Admission Council (GMAC), businesses in the financial services sector, the services sector, and the technology sector were actively seeking MBA graduates. Most MBAs (63% of respondents) work in finance and accounting, followed by marketing and sales, and then general management. According to the results of the poll, the responsibilities that MBA grads take on in different industries change with the times. As one example, the GMAC survey study found that graduates from the class of 2016 are more likely to work in the goods and services sector or in

technology-related businesses than their predecessors, while those from older classes are more likely to work for the government or a nonprofit. The fields of big data, financial technology, blockchain, artificial intelligence, etc., are enjoying a surge of attention at the moment. In the present day, these ideas can be found at the core of almost any company.

As a result, the labor market is likewise slanted in a way that conforms to the norms of the time. This indicates that grads who lack relevant skill sets may be at a disadvantage in the job market

Financial services, service, and IT companies were the most interested in hiring MBAs in 2016, according to a survey by the Graduate Management Admission Council (GMAC). Sixty-three percent of those with an MBA are employed in financial and accounting roles, followed by those in sales and marketing, and then those in general management. The survey findings suggest that MBA graduates' roles evolve over time and across sectors. Graduates from the Class of 2016 are more likely to work in the goods and services sector or in technology-related businesses than those from previous classes, according to a GMAC survey study. Meanwhile, graduates from prior classes are more likely to work for the government or a nonprofit organization. There has been a recent uptick in interest in areas like big data, monetary technology, blockchain, AI, and so on. These concepts now form the backbone of almost every modern business.

The outcome is a biased labor market that reflects contemporary values. This suggests that recent graduates lacking in desirable skills may struggle to find gainful employment.

EMPLOYMENT

Respondents to our survey were asked about the chances of MBA graduates receiving employment within zero to three months after graduation in their region.

From the survey, the average response for respondents from the USA was 33%, followed by Europe at 88% and Asia-Pacific at around 40%. This implies that, on average, MBA graduates in the United States are employed faster than in Europe and China, respectively, as shown in Figure 5.

A. COST

The GMAC survey report ranks cost as a vital inhibiting factor for people enrolling in an MBA programme. The change in the cost valuation of MBA enrolment over time is characterized by the economic conditions of the country and the strength of its currency.

According to the respondents, the average cost value accrued in pursuing an MBA programme varied by country, with the USA recording an average of more than \$20,000 USD. Other currencies converted to USD showed an average MBA enrolment cost of \$20,000–\$30,000, as shown in Table 3.

The cost attached to completing an MBA programme was valued against the significance related to studying an MBA in each country. Some countries, such as China, showed a low preference for this degree compared to other regions in this study. Therefore, the attributed cost of enrolling in an MBA programme was valued low compared to other economies.

Generally, estimating the cost depended on the industrialization level, and it also affected enrolment in an MBA programme. A high preference for an MBA as an essential degree in the current era was followed by a higher cost valuation.

In other terms, the measure of cost, as determined from the GMAC survey results, was dependent on the attached value of enrolling in an MBA programme in the current economy, subject to a particular condition.

This result highlights that cost has a direct impact on MBA enrolment. We speculate that this enrolment decrease is due to the overall decreasing value of the MBA. The results show that individuals who enroll in different MBA programmes expect higher outcomes in terms of acquiring skills that are in high demand in the job market or are required to either become employed or boost entrepreneurship.

However, the cost is one of the most noticeable barriers to enrolment. The results show that this does not have a direct impact on MBA enrolment because there are many individuals who would not mind the cost if the MBA were profitable in terms of payback and ROI and if its value increased in terms of the skills acquired.

B. PAYBACK

Payback refers to the return value of enrolling in the MBA program; for example, this includes the ROI and the duration within which the investment in an MBA education can be recouped. The payback value in this scenario involved the likelihood of becoming employed and the expected outcome (salary). The expected salary of an MBA was averaged at

\$100,000 and higher in countries that highly regard MBA programmes. The acceptability of MBA graduates measures the market value of an MBA, and in return, determines their salary and the likelihood of becoming employed [52]. Additionally, there is a payback in the status that a person gains after completing an MBA program, and this status is also perceived by other professionals, as shown in Figure 6.

Therefore, individuals were evaluated on the payback value of enrolling in an MBA programme. The more considerable value of the payback was what individuals gained after pursuing an MBA, which generally involved valuable factors, such as the acquired skills or entrepreneurship capacity. However, more specifically, this was measured against salary. To determine the payback value, individuals evaluated the average cost of enrolling in and completing an MBA programme (above \$20,000) against the average salary expected for an MBA graduate (above \$100,000), as shown in Figure 7. The payback estimate was high in the region that valued the MBA (the USA) as being critical in the current industrial era.

However, some economies, such as China, which had little regard for an MBA, demonstrated little payback value in an MBA study programme.

In China, payback is a significant barrier to MBA enrolment, whereas in other regions, enrolment is still declining, despite a relatively higher payback. This demonstrates that the value of an MBA is no longer limited to the salary earned but also to other factors that are considered more valuable to the Industry 4.0 era, such as analytical skills, digital adaptability, and innovation capacity.

From our results, payback was ranked as the fourth barrier to enrolment after the cost, employment potential, and entrepreneurship capacity, respectively. It is important to highlight that skills and curriculum are the main variables to assure successful employment and entrepreneurship strength. Employers will be willing to pay higher salaries if their personnel are skilled and have the appropriate skills that are relevant to the current era. The payback issue could then be addressed by offering skillful human capital with great innovation capacity to keep up with the constantly adapting Industry 4.0. Analytical skills and technical knowledge about

technology should be kept in the MBA programme.

Business schools and universities that offer various MBA programs should renovate their curricula and match them with the needs of the job market. If the MBA programs increase their value by offering more updated and valuable curriculums, the cost might be more acceptable by individuals, and the payback would have been more likely to increase.

C. ADAPTABILITY TO INDUSTRY

Adaptability to the current Industry 4.0 era is one of the key aspects that influence the perception of and current attention drawn to the study of an MBA programme. The measure of adaptability involves the significance of an MBA. Most respondents stated that an MBA had become less significant compared to the significance it held in the past. Nonetheless, other respondents highlighted the need to renovate the current MBA study programme and adopt the current industrial needs to adapt to the Industry 4.0 trends. These results show that analytical skills are extremely important in the current era.

Notably, some respondents viewed the current industrial evolutions is not relevant to the MBA. However, they found that the MBA standards can be adapted to contemporary industrial changes, which can lead to an expected increase in the demand for MBA graduates.

Generally, despite a decrease in the significance of an MBA, the responses from the survey results believed that an MBA meets most of the current industry demands, although MBA programmes should be updated by adding vital new skills to the curriculum. Currently, the focus is on MBA analytical skills in the current Industrial Era 4.0. In addition, MBA graduates without engineering backgrounds lack the skills that are essential in every modern business.

Despite the ranking of MBA graduates' contribution being above average, according to the GMAC survey, the results

of this study prove that changing the current MBA study programmes to cohere with the current industrial revolution must be considered, as shown in Figure 9. We argue that

updates to both current MBA programmes and the design of adapting to new curricula must be considered top priorities for business schools and other higher education institutions that

D. EMPLOYABILITY

Employability is another key issue identified in the GMAC survey report. In this study, we define employability as possessing the skills and competencies that allow MBA graduates to be employed. This aspect is characterized to include the preference of an MBA in current economies and to indicate the number of MBA enrolments against the number of job vacancies in the Industry 4.0 era. In the past, holding an MBA degree could easily facilitate access to or movement into higher management positions. At the time, the immense relevance of an MBA led to a significant increase in the number of enrolments. Despite the high value of an MBA, employability was also an issue in the economies that had adopted a different view of an MBA. Today, even with the high-ranking importance that an MBA holds and the high esteem attributed to the analytical skills of MBA

graduates in the present industrial age, issues of employment continue to strongly affect the enrolment rate. Seventy-two percent of respondents saw that the difficulty to gain employment was a significant barrier to MBA enrolment. The GIA assessment results show that employability is ranked last among the barriers influencing MBA enrolment. This can be explained by the fact that the measure of employability includes the capacity of the economy to absorb MBA graduates as well as the measurement of the number of employed graduates. The lack of the appropriate skills has reduced MBA graduates' capacity for employment. Employability was measured as an average, and it could have had a significant impact on the MBA enrolment rate in the Industry 4.0 era.

However, the extent that the issue of employability affects the enrolment rate remains unclear. At this stage of understanding, we believe that the issue could be addressed from two perspectives. The first is to facilitate the MBA graduates' employability by enriching their skills via appropriate and updated curricula. The second is to strengthen the entrepreneurship capacities because economies are not always capable of absorbing the number of graduates, even when they have suitable skills for the present industrial age.

Moreover, MBA programs could spark economic development by designing strong entrepreneurship programs that provide students with the necessary skills to help them to develop their vision to start new businesses and create jobs. This would also improve various key socio-economic growth goals, such as the employment rate, quality of life, community development, exports, and GDP.

IV. DISCUSSION

This study highlights the key barriers in MBA enrolment and states the importance of those factors in tackling the issues of an MBA programme in higher education. From its creation until the 2000s, MBA programmes have grown in both academia and the business world. The objective of MBA programmes is to prepare graduates for managerial functions and encourage collaboration and collective learning among professionals who need assistance to acquire a better understanding of the industrial and business worlds' needs and requirements. The purpose is to enrich graduates' skills and provide them with competencies that are applicable to their careers [53], [54].

Different studies highlight the role of education in Industry 4.0, which is required to improve economic conditions and the rapid development of a country. Table 7 shows some studies that highlight the similar significance of our study.

Moreover, serious criticisms about MBAs began over a decade ago [55]. Some studies pointed out that business schools behave more like businesses than academic entities and that their curriculum was profit-oriented [56]. Some scholars stated that MBA programmes should be designed for practicing managers with substantial work experience rather than inexperienced graduates [57]. Other researchers accused the MBA curricula of being irrelevant to the managerial needs and practices of employers [58] and found a significant disparity [59] between the managerial skills that students have acquired and what was expected from them when they integrated into industries [60]. Assessing MBA graduates' outcomes is a necessity, and very few MBA programmes consistently evaluate and measure outcomes related to student professional development [52]. It was predicted that the MBA might face extinction by 2025 if no actions were taken to address the existing gap in competencies [61].

Industry 4.0 is an era that changes the way higher education institutions are offering MBAs. The vision of Industry 4.0 is characterized by cross-linked production processes and a noticeable shift towards more synergistic and collaborative components within higher education learning and e-learning. As a result, higher education is exposed to a large potential field of research [62]. In consideration of future employment areas, higher education students from different programmes, including MBAs, should be prepared to meet the demands of Society 4.0 and Industry 4.0 [63].

Over the last decade, significant changes were noticed worldwide regarding the MBA's enrolment rate. Those fluctuations are due to a multitude of factors, such as the availability of various substitute master's programmes and the fact that MBAs are no longer exclusively available at prestigious business schools in North America and Europe. Master's and MBA programmes are now globally accessible and at a lower cost. Furthermore, as many universities have revamped and automated their curricula [28], the evolution of e-learning has made MBAs accessible anytime and anywhere. The literature highlights the growing gap between the supply and demand of skills in Industry 4.0 [24]. Industry 4.0 has introduced new technologies and opportunities for individuals, governments, and businesses worldwide [55]. It has also changed the fundamental factors that affect competitiveness in different sectors, such as the financial system, innovation skills, health, education, and other macroeconomic variables [64]. Hence, the creation and maintenance of highly competitive advantages require global skill alignments in all industries. For business schools to provide the changing world with elite managers, they must continue adapting their curricula to the economic, environmental, industrial, and social changes imposed by Industry 4.0 [65].

As emerging technologies have a large effect on industry and education, the need to bridge the gap between the curricula and the managerial requirements of the market in the Industry 4.0 era is increasing. Producing better managers requires a collaboration

between the industry and business schools of higher education institutions [66] because only qualified employees with updated skills will be able to control and manage these technologies [67]. Many institutions of higher education are collaborating with businesses to develop programmes that equip MBA students with the necessary skills to work in the Industry 4.0 labour environment. Additionally, competency analyses have been used as a tool to develop a curriculum for training MBA students to acquire the necessary skills and competencies to work in an automated environment. Preparing individual students to work in a highly automated work environment is critical [68]. For instance, many universities and business schools aim to ensure that MBA programmes incorporate Industry 4.0's skills and requirements to make them competitive and responsive to the societal needs of the digital era [69]. Although the MBA curriculum is one of the most influential barriers to enrolment into MBA programmes, it is not the only one. This study aimed to investigate and prioritize the barriers that affect MBA enrolment in the USA, Europe, and China.

VII. CONCLUSION

This study highlights the key barriers in the enrolment to programmes of MBAs worldwide. Additionally, it provides an overview of how MBA programmes are important in the current Industry 4.0. MBA education is relevant to every industry because of its professional courses, which involve corporate strategy, the market economy, operations, supply chain, finance, and public relations. Although MBA courses are not designed for learning, they can help people to understand the rules of corporate development and the interests of

various departments to enable anyone to increase the success rate or maximize their cooperation. Moreover, an MBA education teaches a framework of thinking. In this framework, everyone is aware of what fatal mistakes to avoid, thereby generating guidance for future work in the business. This study analyses the key factors as to why the enrolment of MBA education is decreasing.

This study focused on the input factors of the education sector. In future studies, we will develop a model to assess the output quality factors, which may help to monitor the current changes brought by Industry 4.0 and Education 4.0.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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