A Systematic Review on the Employability Prediction Model for the Management Students

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ABSTRACT

Purpose*: The demand for management education is on a constant surge that has resulted in quality check of the students who are employed and will be of value to the organisation and country at large. This paper attempts to explore the literature that will help in understanding the students' employability based on attributes that are vital to both industry and academia. The employability prediction model will help the management to understand the students' output quality in terms of being employable or not. It will also help them to improve employability through proper intervention by training and development programs.*

Methodology*: The study is based on the literature of employability models that have been developed using various approaches especially that of machine learning. The published research papers in various journals that were reviewed range from the time period 2006 -2022 have been analysed using ABCD analysis.*

Findings/Result: *The employability models have been developed using machine learning approaches. The necessity of an accurate employability prediction model that serves as a guide to help students and faculty is the need of the hour.*

Originality Value: *Employability models are of great value to the students and institutions as they provide a silver lining in knowing the students' employability. There are several gaps in terms of building an appropriate model that will serve as a scale to measure the uncertainty that exists in knowing the quality of output produced by management educational institutions.*

Type of Paper*: Review paper.*

Keywords: Employability, Employability Prediction, Management Education, Employability Skills, Machine Learning, ABCD analysis.

1. INTRODUCTION :

Employability prediction is the crux of the current global competitive market as it not only defines individual well-being but the well-being of the nation as well. Employability has evolved over a period of time. It is defined as an individual's skills and attributes that benefit oneself, the business environment, and the economy at large. The perception of employability among individuals is their belief to find possibilities for better employment (Berntson, (2008) [1]. The perceived employability of the students and the actual need to be tested wherein the employability prediction model will play a key role. This model will help the students and the institutions to know the gaps that need to be bridged to improve employability (Shenoy, et al., (2019) [2]. Optimizing the talents that define key skills among students will be a crucial step to help employers find the right talent. Talent acquisition teams are in search of individuals who add value to their businesses through their acquired skillset (Crasta, et al., (2021) [3]. Employability is the need of the hour irrespective of the course chosen by a student in higher education. The uncertainty of the outcome of education can be given a silver lining through the employability prediction model. Education today is part of a competitive global market that keeps changing rapidly due to technological advances. As rightly said, the world is a global village is an appropriate statement in the current scenario through the emergence of the virtual work environment. In this technology-driven era, employability is a crucial aspect and the driving force in higher education.

Higher education should keep evolving to produce quality students, highly skilled who can compete in the ever-changing global market. Sustainability is a key attribute that depends on the individual in giving their best to the role assigned is an attribute that needs to be developed by students (Shenoy, et al., (2016) [4].

Employability is influenced by many factors such as skills, knowledge, and personal attributes that are gained through the right education and appropriate training (Timane, et al., (2020) [5]. Young minds need to improvise personal skills, thinking, and continuous learning skills, enhancing their employability. These are generally referred to as employability skills that define the employability of the students. Finding the right skills that employers seek and developing them through proper training initiatives will help in building individuals ready for the rapidly changing workplace (Overtoom, (2000) [6]. Through an employment prediction model, one can access whether the acquired skillset is sufficient to be employable. Such a prediction model will prove a great boon to the academic sector. The model will vary from course to course as skills vary for different fields. Generic skills remain common in all fields such as communication, problem-solving, curiosity, motivation, patience, and flexibility (Paadi, (2014) [7]. Machine learning algorithms are being deployed in educational fields by many researchers in almost all areas to automate processes by building appropriate models (Bai, et al., (2021) [8]. These are also referred to as intrinsic skills of an individual. Singhal, et al., (2020) [9] discusses in detail the gap that exists in employability skills among students and the need to address them. The employability prediction model will play a vital role in every educational institution as it defines the institution's quality and students' perception of employability.

An increase in the demand for management education calls for a check on the students' quality that defines the future of employability. Employability boosts the country's economy and needs to be nurtured and developed in order to gain optimal results (Casuat, et al., (2019) [10]. Management education needs to focus on improving the quality of output in terms of employability & entrepreneurial skills. The employability of management students has been studied by various scholars to determine the gap and improvise the education system to gain optimal feasibility. Data plays a vital role in building an employability prediction model. This Data is the buzzword of the current market that needs to be used appropriately so as to derive useful information and patterns to understand the needs of the current volatile market (Saouabi, et al., (2019) [11]. Big data, machine learning, and predictive analytics are used extensively to determine student performance and employability prediction, which will help build innovative approaches to improvise the learning pedagogy (Bai, et al., (2021) [12].

This paper reviews scholarly articles in the area of employability prediction with an emphasis on management students. Various models have been employed by several researchers to develop prediction models. Employability skills have been used to derive the models along with subject expertise. Data mining techniques and machine learning algorithms have been deployed in order to predict employability.

2. OBJECTIVES OF THE STUDY :

Employability prediction, an important aspect of higher education needs to be studied by considering the course perspective. This paper highlights management students' employability through a prediction model. This study aims to understand the progress of technology in predicting students' employability. Understanding the key skills is very crucial along with the attributes related to personality to define an appropriate prediction model. Building such a model by allowing the students to input their key skills, scores related to tests of acquired skills, and their primary attributes will be able to predict whether an individual is employable or not. The main objectives of the study are as follows:

(1) To explore the literature to find work related to employability prediction in the field of management education.
(2) To find various models that are available in predicting employability.
(3) To understand the appropriate variables and their relationship to employability.
(4) To study the models that have been implemented to gain the optimal feasibility to build the prediction model.
(5) To inspect a user-friendly interactive environment.

(6) To perform ABCD analysis listing the advantages, benefits, constraints, and disadvantages of the employability prediction model.

3. METHODOLOGY :

This paper focuses on the literature available through scholarly publication from 2006 to 2022. The Google scholar search engine is used to collect research papers, review articles and case studies from various national and international journals. The keyword search includes "Employability Prediction", "Management education", "Employability skills", "Machine learning" and "Predictive analytics". The various other sources include books, articles, thesis, and websites published in the area of employability prediction. ABCD analysis is used as a tool to analyse the approaches used in employability prediction of students.

4. REVIEW OF LITERATURE/ RELATED WORKS :

4.1 Need for Employability Prediction:

The education sector is the powerhouse that plays a vital role in the growth of a nation's economy. Imparting the right education and building skills to develop industry-ready individuals is a concern of every higher education institution. The volatility, uncertainty, complexity, and ambiguity of the global market has driven the education sector into improving its quality of output, by providing students with high calibre to face the global competition. The process to improve the students' standards has to lead to the introspection of the curriculum and the training imparted to them. The education sector has a huge repository of data available that can be used to gain insights to improvise the teaching-learning pedagogy. The students' past performance can be used as a yardstick to predict the future that would define students' perception of employability. The employability prediction model will help the institution in general and the students in particular to understand their position in the global competitive market. This understanding can lead to timely intervention from the institution through appropriate training to enhance their skills thereby improving the standards of employability. The rise in new technologies and the volatility of the global market calls for constant up skilling and reskilling among the workforce which in turn demands a check on the output quality by higher education institutions. Higher education needs to be constantly connected with the challenges and opportunities that define the future of students (McGuinness, (2021) [13].

4.2 Role of Machine learning/Data Science/Predictive Analytics in employability prediction:

Recent studies in the area of employability prediction are being carried out using machine learning algorithms. These algorithms have proved beneficial in carrying out research in the educational sector giving insights to stakeholders of education. Among stakeholders, students play a vital role as they not only represent an individual success but also define the country's future economy through their acquired skills. Machine learning algorithms have been used by researchers to predict the employability of students using employability skills, exam scores, and subject expertise. Deep learning frameworks are used in education to predict students' performance which will help faculties to identify the students who need extra mentoring (Doleck, et al., (2020) [14]. Integrating machine learning, data mining, predictive analytics, and data science approach to educational data will help to derive patterns of student performance along with being able to predict the same. Data science and machine learning tools have a very significant impact in management studies as they help in predicting the market scenario and help in decision making (Waller, et al., (2013) [15]. Managerial decisions can be backed up by appropriate analytical insights using business analytics, predictive analytics, and machine learning algorithms so as to extract and predict valuable insights to create a larger impact (Lee, (2022) [16].

4.3 Related Work:

Employability prediction has been studied over the years using techniques of data mining, machine learning algorithms, and predictive analytics. A study by Nagaria (2020) [17] discusses the importance of using data available in higher education institutions to take decisions for future plans and development of the students. The author has used exploratory data analysis to visualize the trends and patterns observed in the data to enhance future employability among management students.

Identifying the attributes that define employability is a crucial step in building a model that would generate accurate results. Casuat, et al., (2020) [18] has done a study that identifies mental alertness and

the ability to express oneself as the key attributes that help in prediction. The study helps in identifying the students lacking these skills so as to use the right training to develop the same.

A study on predicting employability using an internship context has been carried out suggesting a strong relationship between them. This highlights the importance of the experiential learning process through a short-term internship that enhances graduate employability. Management education should highly consider the experiential learning process that will help the graduates to understand the perception of employability from their viewpoint as well as that of the employers. This will provide exposure to understand the work environment, the do's and don'ts which otherwise would remain just as a perception. The study proposed a context-based ML approach for predicting employability status. They identified important predictive features that impact employability using gradient-boosting classifiers. The internship feature showed high significance in affecting employability status providing insights to students and the concerned authorities to review the curriculum (Saidani, et al., (2022) [19].

In the thesis by Hugo (2018) [20] the researcher's objective is to predict the employability of undergraduate business students. The author uses various machine learning models and compares them in order to predict employability. It highlights the problem of oversampling and under-sampling that needs to be addressed appropriately. Class imbalance scenario is a challenge in using machine learning algorithms as a tool for predicting.

Table 1: Scholarly literature on Employability Prediction Model

S. No	Focus/Area	Contribution	References
1	Employability of MBA graduates with HR specialization.	The study reveals that lack of corporate involvement, interpersonal skills, student selection process, faculty expertise, and appropriate curriculum are the main reasons for low employability.	Natarajan et al., (2014).[21]
2	Factors affecting employability skills among management students.	Factors such as analytical skills and self-understanding, general management and work culture, leadership and problem-solving ability, and communication significantly impact the employability of Management graduates.	Shah, (2014). [22]
3	Conceptual model of MBA student employability	The conceptual model is built on the management of students' behavioural aspects and domain knowledge that would influence employability and job satisfaction along with a teaching-learning environment, social support, and developmental activities that work as catalysts.	Mohapatra et al., (2017). [23]
4	Graduate employability using capital individual attributes and context studies in higher education.	The article focuses on developing a framework incorporating six dimensions such as human capital, social capital, individual attributes, individual behaviours, perceived employability, and labor market factors to explore and explain the concept of graduate employability.	Clarke, (2018). [24]
5	Employability scenario among the Engineering and Management students.	The researcher points out remedial measures that can be taken up to improve employability among students. The author suggests updating curriculum, with special focus on skill building, industrial training and internships, retraining faculty, mini	Gethe et al., (2020). [25]

		projects and interaction with industry will help in boosting employability.	
6	Literature review on employability Skills for future demands of work.	The skills projected for the future were dominated by soft skills and technological skills.	Fajaryati et al., (2020). [26]
7	A systematic review on employability and competence development.	The outcome of the study highlights the importance of research that needs to be carried out with a focus on contextual factors that may be key to competence development and employability.	Abelha et al., (2020). [27] .
8	Unravelling employability concept by combining research on employability in higher education and workplace learning.	From the study, it has been gathered that employability in the current scenario is defined as a multi-dimensional, competence-based construct in the fields of research in higher education and workplace learning. The study has increased definitional clarity through the integration of various approaches.	Römgens et al., (2020). [28]
9	Employability- Gap analysis	The study emphasises on the type of training and skill development that must be incorporated to bridge the gap between industry and academia. The study suggests that there is a significant gap in the skills concerning personal grooming, interpersonal skills, and experiential learning that need to be improvised to be better employable candidates.	Sanjivkumar et al., (2021). [29]
10	Employability framework in the Post COVID scenario	The study has proposed an employability framework based on the four-quadrant model of human knowledge by Ken Wilber. It gives a better insight into the concept of employability, with its relationship with various constructs.	Shobha et al., (2021). [30]
11	Attributes that define to predict employability.	The study reveals that research, internationalization, monetary and human resources are among the university attributes that showed direct benefit to student employability. University reputation and alumni factor go hand in hand and have showed positive impact on employability of graduates.	Aviso, (2021). [31]
12	A mechanism to quantitatively enhance employability and entrepreneurship using deep learning	The study proved that there is positive relationship between professional ability and entrepreneurial capital among research university students. This was verified using structural equation modeling. Employment prediction model was built using random forest, Support vector machine, XGBoost algorithms. The model performed well in terms of accuracy and F1 value.	Meng, (2021). [32]

Table 2: Scholarly literature on Employability Prediction

S. No.	Focus/Area	Contribution	References
1	Employability prediction model of MCA students using data mining	Classification techniques are applied to the data to derive a model that fits the best with high accuracy to predict employability. J48 algorithm has the best performance measure with the data under consideration.	Mishra et al., (2016). [33]
2	Employability prediction using secondary attributes.	Employability prediction accuracy was enhanced by considering secondary attributes such as personal, social, psychological, and other environmental factors.	Thakar et al., (2017). [34]
3	Clustering and classification model to improve student employability among IT students	Automation of selecting relevant attributes and building a unified prediction model based on classification algorithms that integrate the four best classifiers with the vote ensemble method to predict employability.	Thakar et al., (2017). [35]
4	Employability prediction of IT students by determining the dominant attributes.	Classification techniques of Supervised learning have been employed to predict employability among IT students. Logistic regression and CHAID algorithms showed the highest accuracy. According to the study IT core subjects, IT professional subjects and gender were the significant factors that influenced employability.	Piad, (2018). [36]
5	Predictive Analytics for student placement.	Several algorithms such as ID3, KNN C4.5, Naïve Bayes, and Multilayer Perception fitted well to the data and gave accuracies above 85%.	Rawat, (2019). [37]
6	CV-based employability prediction using machine learning.	Various techniques like k- nearest neighbour Morris Pratt, etc. have been used to compare the CVs with skills, academics, and experience to shortlist the best candidates.	Pradeep et al., (2019). [38]
7	Students' placement analysis and prediction.	Prediction of student placement has been carried over the secondary data. The random forest classifier provided the best accuracy for the data and was considered to be the best.	Nagamani et al., (2020). [39]
8	Employability prediction using educational data mining algorithm.	Supervised learning models have been used to predict the employability of students. Based on the accuracy score decision tree algorithm performs effectively compared to others.	Jassim, (2021). [40]
9	Research Challenges, and applications in employability prediction.	It classifies students as employable or not, identifies student skills, adjusting curriculum, and foreseeing long-term market demand.	Mezhoudi et al., (2021). [41]
10	Employability prediction using analytical approach.	The employability model developed by considering the attributes that show dependency on employability aimed at classifying the students as employable or not. The second phase	Saini (2021). [42]

		was classifying them based on the salary package as below 4 lakhs or above 4 lakhs. Algorithms such as decision tree. Random forest, Naïve Bayes classifier and KNN were employed on the data. Random forest classifier performed better than all the others with respect to the accuracy measure.	
11	Employability prediction using Machine learning	The paper consolidates machine learning algorithms used for employability prediction by performing an exploratory literature review from the Scopus database. The study highlights the characteristics features, algorithms, and their accuracies.	Moumen et al., (2022). [43]
12	Employability prediction of IT students using contextual factors.	The study revealed that parental financial stability, socio-political, academic, and strategic factors are the contextual factors that have an impact on employability prediction. The deep stacking model performed well with an accuracy score of 80%. The ensemble approach was used to improvise the model performance.	Mpia et al., (2022). [44]

Table 3: Scholarly literature on Machine learning

S. No.	Focus	Contribution	References
1	Students' employability prediction using machine learning.	The paper aims to predict employability of the students using the machine learning supervised algorithms. Machine learning algorithms such as logistic regression, Naïve Bayesian, Neural network, support vector machine, random forest and decision trees were applied on the data. Based on the accuracy measures logistic regression (95%) and support vector machine (85%) were chosen to predict the employment rate.	Akilandeswari et al., (2017). [45]
2	A survey on current Research trends in machine learning	The author describes the application of machine learning tools by researchers in the field of education used to predict student performance, test students, grade students' fairly, improve student retention and support teachers. The study suggests that the appropriate use of machine learning tools in education can be used to develop teaching-learning process.	Kučak et al., (2018). [46]
3	Machine learning and learning analytics by integration data.	The author discusses the process of deriving knowledge from the data using machine learning, educational data mining and LA models. Several models are studied by comparison highlighting their characteristics and relationship with educational data.	Sciarrone, (2018). [47]
4	Machine learning approach to analyse and	Python programming is used to develop the model using machine learning algorithms. Random forest classifier gave the best performance accuracy. The study explains in detail the need and importance of using	Peñalvo et al., (2018). [48].

	predict employability.	machine learning approach in employability prediction. They authors suggest that this research approach can lead to gain new insights on using data to enhance education and opportunities among students.	
5	Machine learning algorithms for predicting student performance.	The study considers attributes based on continuous learning model such as class test, assignment, attendance, midterm marks and course. Machine learning algorithms such as linear discriminant analysis, gradient boosting classifier, Random forest classifier, Decision tree classifier, Support vector machines and k neighbours classifiers were applied. Based on the accuracy measures decision tree and KNN classifiers performed well.	Hasan et al., (2019). [49]
6	Integration of machine learning and data analysis of LMS to improvise online education.	The author has developed a conceptual model that can be used to impart education in the current hybrid learning environment with proper mentoring system that evaluates the students on regular basis. Machine learning, artificial intelligence and big data is used to materialize the model. They also propose to improvise the model by integration block chain and internet of things.	Villegas et al., (2020). [50]
7	Machine learning models in predicting students' performance.	Classification techniques help in predicting the grade of the students' and repression model predicts the marks. The results of this study is used to improvise the teaching-learning pedagogy, evaluate the education quality and gain information future development.	Yousafzai et al., (2020). [51]
8	Application of machine learning algorithm in student performance analysis and prediction.	These score are used to find the domains that are based on the subjects. The main purpose was to develop a web application that will help the students to find employable domains based on their scores and skills.	Patel et al., (2020). [52]
9	Predictive analytics model using supervised Machine learning methods.	A number of algorithms such as decision tree, random forest, and support vector machine and logistics regression were used. The comparative study of these models proved J48 decision tree classifier as the best model based on the accuracy score.	Bujang et al., (2021). [53]
10	Application of machine learning tools for effective decision making on employability.	A combination of several classification algorithms such as Logistic regression, Gradient boosting, Support vector machine, random forest and extreme gradient booting were employed on the data to predict placement status of students. The study found that there is no gender-based difference in salary offered but the MBA specialization did have significant effect on the placement status. In terms of predicting placement status with	Kumar et al., (2021). [54]

		machine learning random forest outperformed the other models. The hybrid model so developed here are strengthened with the use of statistical computation and machine learning techniques.	
11	Prediction of employability index using deep learning	The author here has implemented an employability prediction model using convolution neural network. The study uses convolution neural network approach to predict employability index among college students. The author suggests addition of gender and family background to improve the model performance.	Wu (2022). [55].
12	Machine learning model application in the evaluating employability and entrepreneurship level.	Python language and machine learning framework is used is used to implement the model. Gaussian kernel is the used as the kernel function. The test results show an error rate of indicating that the model well fits the data.	Li, (2022). [56]
13	Employability prediction using ensemble classification modeling.	The paper stresses on developing grit among students during their academic life. It emphasis on achieving long term goals through professional certifications. The ensemble model implemented gave an accuracy of 93.33%.	Maaliw et al., (2022). [57]

Table 4: Scholarly literature on Employability Skills

S. No	Focus	Contribution	References
1	Employer's involvement in developing the employability among postgraduates.	The study revealed that communication and problem solving were the two most vital skills that the employers expect from the students. The study also concluded that the involvement of employers in education as active stakeholders through partnerships with universities will help to bridge the gap of employer expectations.	Maxwell et al., (2010). [58]
2	Education verses employability bridging the gap among engineering and management students.	According to the study communicative skills, critical thinking and problem solving skills are the key skill set the graduates should possess. To develop these skills one needs to incorporate innovative initiatives in the education system so to optimize the skills among young graduates.	Padmini (2012). [59]
3	Employability Skills of MBA students at the entry level from the industry and	The findings indicate that the level of employability skills perceived by the industry are low as compared to the perceived employability skills of the students.	Dhanawade et al., (2015). [60]

	students perspective.		
4	Employability skills perspectives from industry.	The author presents employability skills gap, skills from demand perspective, role and value of knowledge, team work verses interpersonal collaboration and leadership. A detailed study on each of the above said attributes are carried out mentioning their implications. The study confirms the deficiency of skills among graduate exit and industry requirements. Knowledge, teamwork/collaboration and leadership are the important skills that needs to be nurtured through outcome based education. Experiential learning needs to be encouraged that could lead to development of entrepreneurial skill.	Collet et al., (2015). [61]
5	Employability skills in higher education.	The author suggests various approaches that can be taken up by educational institutions to help the students to prepare towards being employable. The study suggests certificate programmes that add as values added credit, skill development programmes to think creatively with problem solving approach, enrichment of the courses to improve on knowledge, attitude, skill and habits among students. Experiential learning through projects and field visits will help to develop the right attitude among students towards employability.	Aithal et al., (2015). [62]
6	Employability skills among MBA students.	The study explored the literature on employability skills that are major drivers in employability. Employers are in constant pursuit of knowledge of technology, domain knowledge, communication skills and aptitude. The author suggest to improvise these skills through curriculum using the right approaches in teaching learning pedagogy.	Gowsalya et al., (2015). [63]
7	Employability and attributes of engineering and technological students.	The emphasis here in gaining insights on the employability skills from the employers' perspective. Technically the student are sound but when it comes to skills and attributes the study suggest the gap that exists and need to be addressed.	Harun et al., (2017). [64]
8	Explorative study on global employability skills.	This review of literature identified ten major skill sets based on the research conducted in this field. This research output can serve as a guide to policy makers to improve curriculum and above all help job seekers to enhance their employability by developing these skill sets. According to the study team working skill is the highest sought after skill followed by problem solving, communication and computer skills.	Sarfraz et al., (2018). [65] .
9	Skills for employability of MBA students and	The study reveals that post-graduate students do not possess the employability skills that employers are expecting. The student's self-perceived notion of employability skills is at a	Das et al., (2019). [66]

	the gap between skill and employability.	mediocre level which in-turn questions their usefulness organization.	
10	Employability skills for future marketing professionals.	The author presents a framework of employability skills for the marketing professional that has undergone digital transformation. Based on the impact of digitalization on the firms on a scale of low to high the author identifies 5 employability skill categories, 29 skills and capabilities that need to be incorporated by the students to keep them industry ready.	Gregorio et al., (2019). [67]
11	Embedding employability skills in higher education in the wake of digitalization and marketization.	The study indicates the need to inculcate work integrated learning along with the traditional small group teaching activities that will help to bridge the gap between graduate skills and labour markets. The paper discusses in detail the employability skills that would play a key role in the wake of digitization and how the traditional methods of teaching needs to be revaluated to meet the changing demands.	Kornelakis et al., (2020). [68]
12	Skill gap and employability among MBA students in India.	The study emphasised that the organisations not only seek for technical aptitude and skills but are interested in communication, critical thinking, and problem solving ability, emotional intelligence and interpersonal skills. Skill gap in terms of acquired knowledge and required knowledge from the employer's need to be balanced in order to improve employability among MBA students. The author suggests that MBA students should emphasise on the soft skills and non-technical aptitudes to increase employable visibility. The study did point out the lack of intellectual capital which of a combination of human capital, relation capital and structure capital. This a very vital skill that helps in overall development of the students.	Bhatnagar, (2020). [69]
13	Enhance English speaking skills among rural MBA graduates of India to improve employability.	The author suggests that incorporating teaching learning methodologies that help students to develop their language skills in more vital considering the current global market. The study suggested individual attention to be given to the students so as to identify the problems and cater the same using innovative methods and curriculum.	Dandu et al., (2020). [70].
14	Employability Skills for 21st century.	The study indicates that out of the 16 skills team player, self-motivation, verbal communication, problem-solving, and being proactive were considered as a priority.	McGunagle et al., (2020). [71]
15	Perception of employability skills among	The study is based on the three stake holder students, faculty and the employers. The author highlights the gap among employers and students	Mainga et al., (2022). [72].

	business students in developing country.	in perceived importance of communication, interpersonal skills and teamwork. The study indicates that employers are satisfied with the academic skills possessed by the students but are not satisfied with skills related to perseverance, initiative and risk taking abilities. The study suggests that enhancing these skills through self-awareness and critical reflection activities or programmes.	

Table 5: Scholarly literature on Management Education

S. No	Focus	Contribution	References
1	Rethinking management education the future challenges of business.	The study emphasises on various challenges related to teaching, research and institutional. Based on teaching challenges the author suggests more strategic alliances and design curriculum that challenges their business thinking rather than route learning. Providing experiential learning along with theoretical knowledge widens the students thinking horizon. The research challenges is to imbibe more of multifunctional approach that deals with solving the real life problems.	Schoemaker, (2008). [73]
2	Paradigm shift in management education.	The paper stresses on the need to have study curricula that emphasis field knowledge rather than route learning. Sharpening personal skills, technical skills and nurturing entrepreneurial skills in the need of then hour.	Gupta, (2011). [74]
3	Management education in India, the trends, issues and implications	The author discusses the issues faced by contemporary management education in India. The challenge is the work on practical approach to management education and industry oriented.	Kumar et al., (2011). [75]
4	Management education and entrepreneurship.	The authors suggest that the education should be based on problem driven and experience oriented that will encourage entrepreneurial mind-set. Industry academia relationship is an important element of higher education that helps in understanding the work environment and its challenges. Interdisciplinary approach experience by being part of projects can also enkindle the entrepreneurship among students.	Singh, (2013). [76]
5	Role of employability skills in management education.	The paper focuses on the employability skills that play a key role in management education. The immense growth in number of management colleges calls improving the quality and employability among students in order to face the challenges of the competitive market. The author suggests that incorporating innovative initiatives in management education will help the stake holders to be in par with the global competition.	Nawaz et al., (2013). [77]

6	Management education	From the study the researcher concluded that the management education needs to change the curriculum to match the industry needs in order to tackle the problem of unemployment. The study suggests to build network of alumni to boost employability by conducting training sessions to develop positive attitude, stress on the need for communication skills and flexibility that is very crucial in the current scenario.	Choudhury et al., (2014). [78].
7	Realigning Indian management education	To explore the key aspects of managerial skills that define in particular the banking sector. The research reveals that the curricular is more focused on theoretical aspects than providing experiential learning. The findings suggest that academic systems should provide overall student development, with ability to think critically to solve business problems. Communication skills need to be approached considering the cognition and comprehension and not just speaking and writing. The study has approaches that would help in realigning the curricular so as to develop employability of young graduates.	Iyer et al., (2014). [79]
8	Sustainability in higher education with emphasis to management education.	The author emphasises the progress sustainable management education has made over recent years. The author suggests that analysing the outcomes of sustainable management education could be an avenue for future research.	Figueiró et al., (2015). [80]
9	Experiential learning	The author highlights the gap that exists between traditional management education and practice. The study confirms the importance of exposing students to entertaining game simulation so as to tackle the challenges that arise in the business world.	Eckhaus et al., (2017). [81]
10	Management education and sustainability.	The paper discusses the transformation learning that is capable of enhancing shared value rationality in business administration. The paper suggests a practical approach to learning that will enable the students to be industry ready.	Brunstein et al., (2018). [82]
11	Enhance employability by embedding action learning among Management undergraduate students.	The author highlights the need to create students employable ready by considering the growth and demand that is in surge for management education. The study suggests teaching employability skills to the undergraduate students rather than route programmed knowledge. the integration of questioning insights and scholarly practice approach will help management students to equip themselves to the work environment.	Groves et al., (2018). [83]
12	Sustainability in management education	The paper critically analysis factors influencing Biggs' 3P sustainable learning. 'Walk the talk'	Kanashiro et al., (2020). [84]

		is the advice that the paper suggests to faculties in order to add credibility to sustainable values.	
13	Management education structure.	The paper emphasizes on comparison and contrasts of various modes of education and analysing them using SWOT. The analysis indicates that management education should be more of experiential learning with sufficient internship that will test the theoretical knowledge.	Goyal et al., (2021). [85]
14	Entrepreneurship and management education.	The study highlights the diversity and impact of entrepreneurial education to the society at large. The author suggests incorporation of digital transformation and crisis management in entrepreneurship management education.	Ratten et al., (2021). [86]
15	Sustainability Management education	The paper emphasises student perceptions of global sustainability that need to be addressed so as to optimise sustainable management education. Five pillar model comprising of social, political, environmental, corporate and economic was developed to improve sustainability.	Greenland et al., (2022). [87]

5. CURRENT STATUS & NEW RELATED ISSUES :

The study under consideration is a field that is in demand in the education sector. The study focuses on the management students' employability predication model based on the attributes that play a vital role from stake holder's perspective. Employability prediction can be considered as the tool for measuring the uncertainty that exist among the graduates towards their end of studies to decide on their employable status. As discussed in the previous sections, many researchers have developed models to predict employability and performance of students in various fields such as engineering and management sector using various approaches of predictive analytics, machine learning algorithms and data science. The management education is not yet fully evolved with a model for employability prediction. The aim of this study is to find the gap that exist in the literature available and work on developing a model optimal and feasible to the students of management education. With an increase in demand in management education and the growing global demand for skills, it's very important to check the quality of the output created through educational institutions. The employability prediction model will help the institutions to know the students better and prepare them to meet the global competitive market that evolves exponentially.

6. IDEAL SOLUTION, DESIRED STATUS & IMPROVEMENTS REQUIRED :

The ideal, desired status and improvements that are required in the area of employability prediction among management students can be summarised as follows:

(1) **Identifying factors:** This is a crucial step that helps in choosing the right factors that influence the employability model. These factors should be chosen with great care as they define the very foundation of the model.

(2) **Building a conceptual model:** With the right attributes or factors in place, a conceptual model defining the dependency and relationship between factors should be developed.

(3) **Gathering information**: Once the conceptual model is in place the data for building the employability model needs to be collected using an appropriate instrument that is tested for reliability. The data so collected needs to be explored to clean the data and find the patterns that exist in the data.

(4) **Testing the variables:** Based on the cleaned data, the independent variables considered need to be tested for the significance to check for the level of dependency with the dependent variable using appropriates statistical test.

(5) **Applying the model:** The variables or factors selected are then used to build the models by applying various machine learning algorithms. The model feasibility and applicability is checked based on the algorithms that will explain the employability.
(6) **Testing the model accuracy:** The model built by considering various algorithms is checked for performance using accuracy measures. An ensemble approach will be considered in order to predict the employability with the best accuracy.
(7) **Creating a user friendly interface**: The model built by considering the above steps will then be made available to the end user by creating a user friendly interface. This interface will help the end user to input the values of the attributes based on which the employability will be predicted as to whether they are employable or not.

7. RESEARCH GAP :

Majority of the research works undertaken earlier are with respect to the employability of engineering and technology students. A few papers do concentrate on management students but do not consider all the factors that influence their employability prediction. Based on the approaches considered, several algorithms are implemented to predict employability. Model performances such as accuracy in particular vary from algorithm to algorithm based on the data. The results of the studies carried out may differ based on socio-demographical variables due to the difference in the acquired skillsets of students. The current study will focus on the management students of Mangalore city which is the hub of education. It will consider the factors concerning all the stakeholders and derive a prediction model that will benefit in improving the employability of management students in Mangalore.

8. RESEARCH AGENDAS BASED ON RESEARCH GAP :

Based on the review process conducted, the researcher proposes the following:
(1) What are the factors influencing the employability of management students from the employer's perspective?
(2) What is the conceptual framework of the employability prediction model for management students?
(3) How do we test the variables under consideration with respect to the employability of management students?
(4) How to we combine machine learning algorithms so as to provide the best model based on accuracy measures?
(5) What are the challenges of building a model that takes into account all the factors influencing employability prediction?
(6) What are the benefits and limitations of the employability prediction model for management students?
(7) What suggestions do you have that could improve the model for predicting the employability of management students?

9. ANALYSIS OF RESEARCH AGENDAS :

Employability prediction model for the management students will consider the employer's, faculty's/institutions', and students' perspectives in order to gain the appropriate attributes. The researcher intends to check the dependencies on the factors considered through statistical methods to derive their significance. Based on the selected variables, the conceptual framework of the model is to be developed indicating the relationships. Identifying the appropriate machine learning algorithms that fit well to the data will be implemented and performance based on desired accuracy measures will be considered. The ensemble model will be used to predict the employability reporting the highest accuracy measures. A user interface that is friendly enabling the end users to enter the required information and then predict the employability status will be developed. The researcher wishes to use two phase model that first determines the eligibility based on the academic score and then predict employability of the students. The model testing and validation will be done in order to be sure that the employability status is well classified with least error rate.

10. FINAL RESEARCH PROPOSAL/PROBLEM IN CHOSEN TOPIC :

A comprehensive study and evaluation based on the available literature and the proposed methodology for developing an employability model will be undertaken as a mega research topic to understand the study area.

10.1. Proposed title: Employability prediction model for Management students - Ensemble approach.

10.2. Purpose: Education output is a very key aspect towards building the future of the country's economy. This vital aspect needs to be understood, developed and trained in the right direction in order to attain its full optimality that is to develop students with employable attributes who along with individual success will lead to overall development of the organization and country at large.

10.3. Research Objectives: The objectives of the proposed title are listed below
(1) To understand all the contributing factors that affect employability prediction.
(2) To study the importance of employer perspective of desired skillset so as to map it with the acquired skillset of the management students.
(3) To derive a conceptual framework that will consider all the stake holders' perspective with the attributes that play a vital role in employability prediction.
(4) To develop training and development initiative that will help the students to be employable which in turn improves the institutions quality of output.
(5) To understand the various domains and their requirements that will help to match the students with the right domain.
(6) To access the challenges of building an employability model that will prove beneficial to all the stake holders at large.

10.4. Proposed methodology:
Study population: Post graduate students of management education in Mangalore.
Study sample: A sample of size 500 and above will be used in order to derive a model through machine learning algorithms.
Instruments: A simple random sampling method will be undertaken to collect the desired sample. A questionnaire approach will be considered with mixed form of responses in order to collect information that is required to carry out the study.
Once the questionnaire is framed based on the attributes, the relationship between variables using inductive approach will be established using statistical tools. Further using the data collected through the instrument will be explored using exploratory data analysis using R programming. Patterns that prevail in the data will be studied along with treating missing values and outliers. The cleaned data will further be divided into training data, validation data, and testing data.
Analysis and interpretation: Based on the training data, appropriate machine learning algorithms will be implemented, validated and tested in order to gain the best accuracy. An ensemble approach with various algorithms will be implemented so as to improve the prediction accuracy.

11. ABCD ANALYSIS OF EMPLOYABILITY PREDICTION MODEL FOR MANAGEMENT STUDENTS :

ABCD (Advantages, Benefits, Constraints and Disadvantages) analysis proposed by Aithal, (2015) [88 - 89] is a process of analysing business models or concepts so as to gain information regarding the advantages, benefits, constraints and disadvantages of the concept under consideration. ABCD analysis is adopted in various studies to highlight the understanding of concept of under consideration [90 -100]. This helps in gaining more insights in understanding the concept and paves way to critical examination of the process.
Advantages:
(1) To help the management students to understand their perception about employability.
(2) To identify the employability of the students that defines the output quality of the institution.
(3) To help the management education sector to identify the students who need to be mentored in order to be employable.

(4) To bridge the gap between the industry and academia.

Benefits:

(1) Benefit the institutions to develop the curricular that match the industry requirement.
(2) Identify the key attributes that are the pillars of employability.
(3) Provide training and development that will enhance the knowledge and skills of the students.
(4) Provide the students and management a scale to measure the effectiveness of the knowledge imparted.
(5) Aligns the students' employment based on their specialization with the right domains.

Constraints:

(1) Defining and measuring employability is a major challenge.
(2) Incorporating all attributes that influence employability.
(3) Handling incomplete information.
(4) Problem of imbalanced data leading to artificial method of balancing classes.

Disadvantages:

(1) Accuracy of the prediction model.
(2) Time bound complexity.
(3) Change in the skillset from employer's perspective.

11. SUGGESTIONS TO IMPLEMENT RESEARCH ACTIVITIES ACCORDING TO THE PROPOSAL :

The following suggestions are considered to implement the proposed work on employability prediction model for the management students.

(1) To approach the employers and understand the skills that are the drivers of employability with respect to various domains.
(2) Identify the attributes that are of importance from the academic viewpoint.
(3) Use the literature available to understand the relationship between the various factors under consideration.
(4) Approach educational institutions of management studies to gain data required for the study.
(5) Understand the various machine learning models that help in predicting employability.
(6) Create a user interface that will help the stakeholders to benefit from the model.

12. CONCLUSION :

The paper proposed is a systematic review of literature based on the employability prediction model for management students. The study has explored the literature to find the work carried out by scholars in predicting employability using machine learning models. The study provides a comprehensive perspective in terms of the various machine learning models that are implemented to classify the students as employable or not. In general, logistic regression, support vector machine, decision tree, K nearest neighbour classifiers, and J48 were the algorithms employed. The variables or factors considered by the models and their relationship with the dependent variables are highlighted. The models implemented resulted in varied accuracy and performance measures. The optimal models chosen by scholars differed from person to person based on the group of students considered and the algorithms used. A few studies did work on creating a user interface using python programming.

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