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Impact Of Industry 4.0 On Digital Marketing For Higher Education

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Abstract

Aim: This paper investigates the importance of Industry 4.0 and its impact on Digital Marketing for Higher Education. The general perceptions of Industry 4.0 (I4.0) as is just applicable to the manufacturing or production-related processes are yet to be comprehended and widened its scope. The researchers in this paper aim to explore how well the loop of 'Physical-Digital-Physical (PDP) can well be integrated and adopted by the Higher Educational Institutions (HEI) in their marketing practices and strategies from the perspectives of the academic administrators and the faculty members. To achieve this objective, the researchers have conducted Longitudinal Studies (Omnibus Panel) for determining the correlations between those samples and variables of the digital marketing practices in the light of I 4.0 prevalent in those selected higher educational institutions.

Design: The primary data were collected by conducting an online survey, circulating a structured questionnaire of 28 questions set on the Likert Scale by way of Google form among the participants. A total of three hundred and forty (340) responses were received out of the total three hundred and sixty-five (365) forms circulated from 34 higher educational institutions including a few higher secondary schools, a few colleges and a few universities. The researchers, in this paper, have applied the descriptive research method leading to empirical research outcomes. The questions were designed in such a way that the current trend of Industry 4.0 is known to the participants and the need in implementing the I4.0 in the service sectors like marketing for education. Instead of using Cross-Sectional Studies, the researchers employed Longitudinal studies (Omnibus Panel - as, though the same number of participants were approached to carry out the survey, they all were having different experiences and perceptions towards educational marketing under I4.0). Secondary data were collected by reviewing an adequate number of related literature on a similar topic, analyzed, evaluated, and the results were reported by way of interpretation.

Outcome: The outcome of the Confirmatory Factor Analysis (CFA) shows that the consistency, reliability, and validity of the Likert scale used for getting the feedback on 28 pre-designed core questions from all the respondents to reconfirm the applicability of the model already used and specified by Nanjudeswaraswami, T.S et.al (2021) in their research. Subsequent Percentage Analysis and Trend Analysis on various measures of data was carried out to assess the efficacy of the responses across the respondents for the variables in substantiating the analysis of the data and interpretation of the results. The use of artificial intelligence (AI), augmented reality (AR) where the integration of Cyber-Physical-Systems (CPS) are implied for digital marketing of educational services; where Total Quality Management (TQM) in the process is paramount important. The outcome of the research indicates that to survive and moving ahead in the market, digitization is of utmost importance where quality expects to meet the expectations of prompt delivery of educational services in the gamut of industry 4.0 imbibing the changes voluntarily.

Constraints of the Investigation: The samples were drawn from 340 employees and professionals ranging from teaching to academic administration; who either know about Industry 4.0 (I4.0) or work by utilizing digital marketing practices for their respective institutions. Though the samples were drawn from 34 higher educational institutions (in the city of Bangalore, India) including higher secondary schools, Colleges, and Universities, the limitation is the number which seems to be very less to make it as a benchmark for confirming the general application of this study to larger population across wider demographics on a case-to-case basis.

Practical Implications: The outcome derived from the application of various methods and analysis (used) helps the emerging entrepreneurs, marketing practitioners, future researchers, educationists, academic administrators, marketers, policymakers, and executors to understand various elements and factors responsible for the rise and fall of digital marketing practices. It is suggested to opt different strategies and measures to be taken to strengthen the existing system to achieve the niche and sustainability in the Digital Marketing practices for higher education in the Industry 4.0 scenario characterized by Artificial Intelligence, Machine Learning, and Big Data exploration, extraction, and exploitation.

Need and Value Addition: There are only a few research papers available on the Digital Practices in Services Marketing in respect of Industry 4.0, though a few are accessible on Marketing Practices for manufacturing and allied activities. Since marketing for services is paramount in the digital era, Industry 4.0 can be a great booster in that direction

Keywords: industry 4.0, internet of things in services marketing, digital marketing for higher education institutions, physical-digital-physical

Introduction

Industrial Revolutions have ever been changing the facets of societies through various social processes. The aftereffect of each phase of such revolutionary evolution has brought innovative webs of radical structural and functional changes. It is the human tendency to quench his thirst by identifying, applying, and bringing changes in the existing systems with novel methods of doing things. The ultimate objective of any such revolution is to have consistency, quality, productivity, and longevity. Technology, being the catalyst in the initiation of establishing the system in general and education in particular, has an important role to play as the propeller in driving the innovation. In the service sector, industrial revolution 4.0 (I4.0) has created the market demand for quality education imbibing technological advancements not only in the pedagogy but also in the survival of various competing players in the market to cater their products and services to qualified customers. Since attraction, retention, and conversion of customers are the basic purpose of marketing - be it of ordinary to excellent, irregular visitors to regular customers, and strangers to promoters or brand ambassadors, all the 11 Ps of marketing have greater roles to play. Besides the seven (07) Ps of traditional marketing mix viz: program, price, place, promotion, people, physical evidence, process; the newly emerged concepts called additional four (04) Ps viz: performance, position, pleasure, and pointing out have a great impact in deciding the effectiveness of marketing for higher education in the Digital Era. The researchers through this paper have analyzed various factors and elements which contribute to Digital Marketing for higher education in the present digital era and also how Industry 4.0 can have its impact on marketing for higher education. The efforts of the researchers in edifying this paper have necessitated them to review and understand many related pieces of literature as the primary data collection source. Based on the insights inferred from the review of the related pieces of literature, the subsequent design of a structured questionnaire helped achieved the survey done online through Google Form on the impact of industry 4.0 in marketing for higher education. The responses from three hundred(340) actively participated participants from academic administrators & teaching staff who are directly in touch with promotion of their brands, of twelve (12) higher secondary schools, fifteen (15) Colleges and seven (07) Universities located in the city were collected, verified for completeness, analyzed, and interpreted on various measures and the results are exhibited.

Literature Review

The researchers have reviewed the related literature on the impact of industry 4.0 on various segments of businesses including products and services and how the transformation of marketing has taken place from traditional to digital in the higher education sector.

Relationship Management has a vital role to play in service marketing. The survival of any business establishment depends on the relations that it retains with its customers and the very relation creates values to both the organization and its customers for long. The education sector is not exceptional in relationship management. In the modern age of Industry 4.0, digitization has remarkable impacts on the prompt delivery and quality of services as in the case of manufacturing does. It has been substantiated by the contributions made by the researchers from time to time. The fourth industrial revolution is characterized by the optimum utilization of advanced technology on digital platforms, be it of the production process or delivery of services. A coherent marketing mix can be obtained by using the right

kind of marketing mix (Kotler & Patrick, 1981) [01]. Since the education market is flooded with an abundance of offers and value addition, it is easy for the students to make instant choices with the help of advanced devices on digital platforms. The question that emerges here is how skilled the service providers - the marketing team - are in conveying and convincing the prospective students to imbibe their services (Levine, 2000) [02]. Of course, the elements of demography cannot be set aside while thinking and doing marketing for higher education under Industry 4.0. The factors that might strongly affect the process of students acquisition will generally be the type and size of the institution, age along with the Vision and Mission of the institutions, and also the ethical governance and commitments of the leadership (Sathivel et al. 2005) [03]. To obtain a holistic business model in the marketing of higher education, it is paramount important to have integration of various mixtures of marketing Ps according to the subjective requirement of the specific institution to bring the competitive advantage (Enache, 2011) [04]. The change of mindsets capable to create changes in the existing systems and processes cannot be set aside in making industry 4.0 ready to use (Cernohlavkova et al., 2013 and Zemanova Drulakova (2020) [05].

In the service spectrum, the new technologies have been changing the service demands and expectations at the primary level and longer relationships with the firm and the consumers substantially where the benchmark is the quick response to customers' desires by the firm (Lancioni, 2013) [06]. In the process of successful implementation of Industry 4.0, it necessitates adding value to the students in the existing system and process (Laura, 2015) [07]. In the process of such integration of functions and processes, while maintaining the web of such relations, the firms need to have three types of integration viz: vertical integration, horizontal integration, and end-to-end integration to have better efficacy and effectiveness of products and services (Weller, Kleern and Piller, 2015) [08]. A well thought-out-procedure run by a qualified and professional team having technological acumen is inevitable in carrying out the I4.0 (Cihelkova et al., 2020 and Zemanova, 2015) [09]. The customer-centric focus and approach help the institutions deepening their digital relationships with more empowered customers by way of optimizing the Customer Relationships Management (CRM) viz: innovation in customer service, customizing the education services, driving customer-centric marketing and channel access, building a customer-focused supply chain, using effective data analysis tools to meet customer requirements and improve operational performance and efficiency based product or service development on customer specifications (PWC, 2016 Global Industry 4.0 Survey - Industry 4.0:Building the Digital Enterprises) [10].

Industry 4.0 is a by-product of demands and pressures from the market where rapid innovation and prompt and quality service delivery are the key elements (Cihelkova and Nguyen, 2018) [11]. It is imperative to note that radical improvements in the efficiency of services provided can lead to enhanced personalization in I4.0 (Salama and Olah, 2019) [12]. Production that happens inside the manufacturing facilities needs to maintain a relationship with its market which is taken care of by the marketing (Bettiol, Marco, et al., 2020) [13]. The resistance to change under the pretext of replacement of human elements by high powered technology is baseless as data collection and turning them into value-added information applying cognition is paramount importance and which can only be done by humans wherein the technologically advanced device is just a device to support the decision-making process (Dinardo et al, 2020) [14]. It has rightly been said that while implementing Industry 4.0 5,00,000 jobs will be lost, but 9,00,000 will be created (OECD Report, Ministry of Economy of the Slovak Republic, 2020) [15].

Review of Literature: At a Glance

Sl. No	Impact **of Industry 4.0 on Digital Marketing for Higher Education**	**Reference**
1.	Coherent marketing mix - need of the hour.	Kotlar & Patrick, 1981
2.	Skilled service (marketing team) providers for convincing and conveying the benefits and core values of the institutions to the prospective students.	Levine, 2000
3.	The impact of various factors like type, size, & age of the institutions, innovation, and implementation of advanced technology, vision, mission, and values system of the Leadership.	Sathivel et.al, 2005
4.	Integration and mixing of the 11 Ps Marketing in the right way according to the specific requirements (Subjective)	Enache, 2011
5.	Change in the mindset of the leadership can be a leap towards successful implementation of I4.0.	Cernohlavkova et al., 2013 & Zemanova Drulakova 2020
6.	Quick response to customers' requirements is the benchmark in customer delightedness under I4.0.	Lancioni, 2013
7.	Value addition to the existing system and process using advanced technology in the higher education institutions.	Laura, 2015
8.	For successful implementation of I4.0, three kinds of integration are required: vertical, horizontal, and end-to-end.	Weller, Kleern and Piller, 2015
9.	A well-thought-out procedure run by a quality team of professionals with advanced technological acumen are the prerequisite.	Cihelkova et al., 2020 and Zemanova, 2015
10.	Customer-centric approach, CRM, service innovation, market research and analysis, changing needs of customers, data analytics.	PWC, Global Industry 4.0 Survey - 2016
11.	Rapid innovation and prompt service delivery are the key components in I4.0	Cihelkova and Nguyen, 2018
12.	Radical improvements in the efficiency of services provided lead to the personalization of service brand.	Salama and Olah, 2019
13.	I4.0-Inside production needs robust relations with the market outside - production-marketing dichotomy.	Bettiol, Marco, et al., 2020
14.	I4.0 cannot replace human factor by device - Data collection and application of cognition is important to use statistical tools; Devices can only be support in decision making	Dinardo et al, 2020
15.	Importance of augmenting technological advancements in skill enhancement for generation of job and to avoid job loss.	OECD Report, Ministry of Economy of the Slovak Republic, 2020

Hypothesis

H0 = Industry 4.0 must have different approaches toward products and services differently. Manufacturing needs more technology-machine interaction but services need more technology-human interaction.

H1 = Industry 4.0 must-have similar approaches toward products and services alike. Both are having limited human elements involved.

Acceptance of H0: The results of data analyzed strongly support the impact of technology on both products and services under the preview of Industry 4.0 (I4.0) and manufacturing needs more of technology-machine interaction but services need more technology-human interaction than machine. The human elements cannot be eliminated in any process and function under Industry 4.0.

Methodology

The researchers, in this manuscript, have employed Descriptive Research Methodology to draw empirical research outcomes. Confirmatory Factor Analysis (CFA) was carried out as there was ample literature available to review and draw the inference supporting one of the given hypotheses. The researchers had reconfirmed the reliability and validity of the outcomes already drawn by the researchers in the past. Though many types of research were carried out to test the efficacy of Industry 4.0 in the manufacturing sector, a very limited number of researches were conducted to substantiate the similar trends in the Service sectors as well; hence the gaps were felt by the researchers while applying the same in the service sector in general and education in particular. The collected data were analyzed using simple statistical methods having percentage and trend analysis and results were interpreted and reported. The outcome of both primary data analysis and secondary data analysis shows a similar trend of behavior by the population towards products and services seeking different approaches.

Data Collection And Analysis

In this manuscript, the researchers have used Confirmatory Factor Analysis (CFA) for the analysis of both primary and secondary data that have not only been applied in a similar type of data but also employed for understanding the close proximity of secondary data on primary data to reconfirm the validity and reliability of obtained results applied on the manufacturing sector to service sector.

Prımary Data

The primary data collection was carried out online with the help of a structured questionnaire (google form) of twenty-eight core questions (set on the Likert Scale) for conducting a survey. The questionnaire was circulated among three hundred and sixty-five (365) participants (academic and administrative staff) of a total of thirty-four (34) higher education institutions that include higher secondary schools (12 Nos.), colleges (15 Nos.), and universities (07 Nos.). Out of the total three hundred and sixty-five (365) questionnaires circulated, three hundred and forty (340) responses, completed in all respects, were received. The analysis, interpretation, and statistical significance of those three- hundred-and-forty samples were reported in the form of tables, graphs, and explanations.

Secondary Data

The researchers have come across around twenty-five (25 Nos.) related literature and analyzed them thoroughly before opting a selected few from among for in-depth understanding and further analysis. Out of the total papers analyzed in the first round of review of literature, fifteen (15 Nos.) were found to have close relations with the set hypothesis and hence finally taken for carrying out this study.

Research Gap

On analysis of different variants for their correlations and coefficients, it is found that numerous studies and researches have been conducted on Industry 4.0 in respect of manufacturing and allied production process of physical goods. The lagging in emphasizing intellectual acumen in the getting optimum from the time and human resource causes the process of adoption of Industry 4.0 a lame-duck one. A top-down approach in integrating and strengthening the education institutions is imperative to initiate the skill process from the very beginning, for which an overhauling of the whole system and process is inevitable. The intended results of the adoption of technological dynamism can happen by strengthening the primary education system onwards with the application of advanced technology starting from the rural areas. The inadequate researches on this direction might be the hurdle in achieving the desired output to compete in international markets of quality and productivity.

Samplıng

The samples were collected from the higher education institutions viz: a few Higher Secondary Schools, Colleges, and Universities using the stratified random sampling method making the selected samples represent the entire population of five (05 Nos.) teaching staff and five (05 Nos.) administration staff from each institution who are actively involved in technology utilization and public relations on digital platforms in their respective institutions.

Samplıng Desıgn

The samples were drawn giving an adequate representation of the target population of these institutions. The selection of respondents was further made on the basis of either their knowledge of Industry 4.0 or their involvement in implementing advanced technology in the promotion of education services in their respective institutions. The researchers have applied proportionate stratified random sampling where the sample size is directly proportional to the population size of the entire population strata as each strata sample exhibits the same sampling fraction.

Samplıng Method, Populatıon & Sample Sıze

The method used here is of Proportionate Stratified Random Sampling = nh = (Nh/N)*n. [nh = Sample size for hth stratum; Nh = Population size for hth stratum; N = Size of entire population & n = size of entire population].

The total population of these thirty four (34) was divided into two strata teaching and non-teaching. Out of the total population of seven hundred and eighty (680) taking together of two strata as follows:

Stratum	Teaching	Non Teaching	**Total**
Population Size	380	300	**680**
Sampling Fraction	1/2	1/2	**1/2**
Final Sample Size	**190**	**150**	**340**

Conceptual Framework

The researchers in this manuscript have used a conceptual framework having the variants of both the primary and secondary data to investigate the relations between different variables that might have direct or indirect impacts on the performance of those variables used in the marketing of educational services under Industry 4.0. In the edifying of the conceptual framework, the researchers have undertaken the test of correlation among the variables drawn. The Marketing Mix Model was subsequently developed to analyze the category of defined variables in line with Mc Carthy's model with the help of the same data set intending to assess the effectiveness of different variants to maximize the Return on Investment (RoI) in the business model employed.

Variables under Primary Data (Questionnaire)	
[01] Awareness of Industry 4.0.	[15] How does the rural India play significant role in the success of I4.0?
[02] Awareness of various Industry Revolutions 1.0 to	[16] What is the role of primary education in

4.0	bridging the skill gap under I4.0?
[03] What is the Scope of I4.0 (only for Manufacturing or for both products and services).	[17] How does the Leadership Skill gap affect the impediment in I4.0?
[04] Which stage of academic activities the I4.0 should begin with School, College or On the Job?	[18] What is the relationship between cost-technical issues and talent issue?
[05] Will the emergence of advanced technology under I4.0 reduce the work load of human?	[19] How does I4.0 integrate human with machines for networked value chain?
[06] Will I4.0 make human more intelligent and productive transforming the pressure from body to brain?	[20] What is the role of robotics, additive manufacturing laser cutting etc in I4.0?
[07] Will the I4.0 be capable to replace the human with machines or devices?	[21] Does the advanced technology bring down values of human relations under I4.0?
[08] What is the role of advanced technology in meeting the consumers preference of quality, speed of delivery, the accuracy, cost under I4.0?	[22] Has the I4.0 enhanced the responsibilities and accountability of management and teaching fraternity?
[09] What is the role of data security and management in the efficient management of services under I4.0	[23] What is the role of Centre for Excellence (CFE) in marketing of educational services?
[10] What is the role of big data analysis in the integration of man with machine (brain with technology)?	[24] How the skills - Soft skills, Life Skills, problem solving, critical thinking and analytical ability are important for I4.0?
[11] What are the core areas where the impact of I4.0 can be influenced in the Marketing of Educational Services?	[25] What is the significance of word-of-mouth marketing in Marketing for Educational Services under I4.0?
[12] What is the importance of Services Marketing from retention to brand loyalty?	[26] What is the importance of National Manufacturing Policy, 2017 in economic development under I4.0?
[13] How does the invisible part of marketing and CRM play vital role in Value Addition and Return on Investment?	[27] What is the importance of customer retention rate reducing the churn rate giving better competitive advantage under I4.0?
[14] What is the role of ethics in marketing under I4.0?	[28] What is the role of Six Sigma (Overall Quality of 99.99966%) under I4.0 in Services Marketing.

Marketing Mix Modeling for Educational Marketing under Industry 4.0 (I4.0)		
[1] Incremental Drivers	**[2] Base Drivers**	**[3] Other Drivers**
[01] The drivers that draw contributions from promotional activities viz: TV, Print Ad. Digital Spends, Social Media, Price Discounts and Promotion.	[01] The drivers help achieve required outcomes without any advertisements. Brand equity of the services acquired during the years. These drivers are fixed until any economic volatility or environmental changes happen.	[01] The drivers that will be sub-components of base line factors and are measured as the brand value accumulated over a certain time frame,

		due to long term impact.
I - Primary Data Variables Integrated [1-28]	**I - Primary Data Variables - Integrated [1 - 28]**	**I - Primary Data Variables Integrated [1-28]**
[1, 2, 15, 18, 20, 21, 23, 26, 28]	[4, 5, 6, 7, 11, 12, 13, 14, 17, 22, 24, 25, 27]	[3, 8, 9, 10, 16, 19]
II - Secondary Data Variables Integrated [1 - 15]	**II - Secondary Data Variables Integrated [1 - 15]**	**II - Secondary Data Variables Integrated [1 - 15]**
[3, 4, 7, 8, 9, 10, 11, 13]	[1, 2, 5, 6, 12]	[14, 15]
III - Combined Integration (I + II) of Incremental Drivers [17/43]	**III - Combined Integration [I + II] Of Base Drivers [18/43]**	**III - Combined Integration [I + II] Of Other Drivers [8/43]**
Value of MMM (%)	**Value of MMM (%)**	**Value of MMM (%)**
40%	**42%**	**18%**

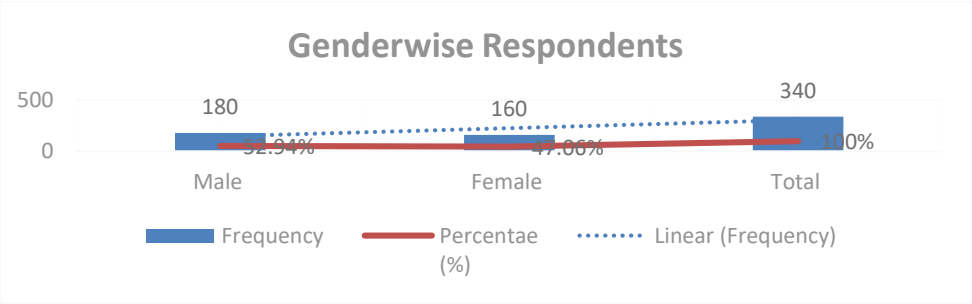
[The model was developed by the researchers in line with the marketing mix modeling with modification as required to fit the variables taken for study and analysis]

Since the base drivers are constant (except in case of any volatility in the economic condition of the individual firm or economy) can be independent of the other two drivers and incremental drivers depend on and can be a booster but subject to the value the institutions have already generated. The other drivers in this model are purely based and depend on the value already generated by the institutions.

Data Analysis

[Table 1: Respondents Gender-wise Frequency Distribution]

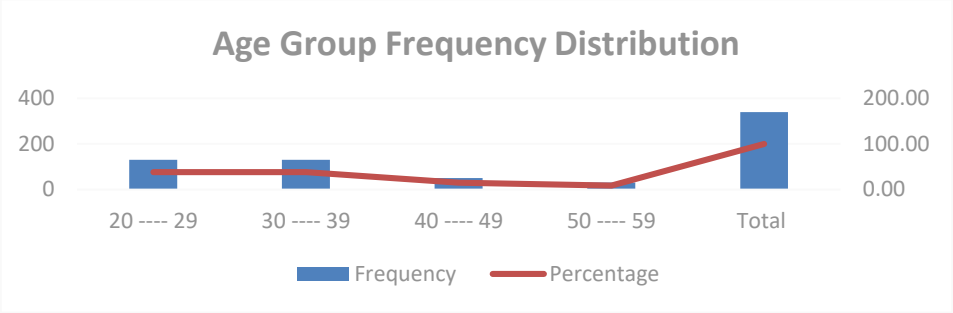
Gender Sample Size (340)	**Frequency**	**Percentage (%)**
Male	180	52.94
Female	160	47.06
Total	**340**	**100**



[Figure 1: Respondents Gender-wise Frequency Distribution]

[Table 2: Respondents Age-wise Frequency Distribution]

Age Group Yrs (Sample Size = 340)	Frequency	Percentage
20 ---- 29	130	38.24
30 ---- 39	130	38.24
40 ---- 49	50	14.70
50 ---- 59	30	08.82
Total	**340**	**100.00**

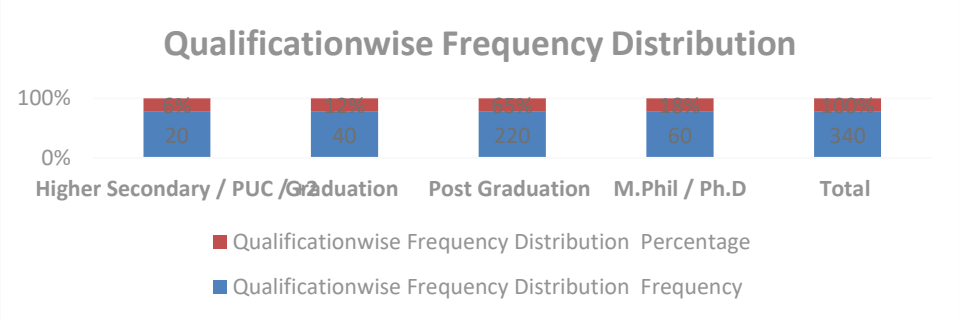


[Figure 2: Respondents Age-wise Frequency Distribution]

[Table 3: Respondents Qualification-wise Frequency Distribution]

Qualification-wise Frequency Distribution

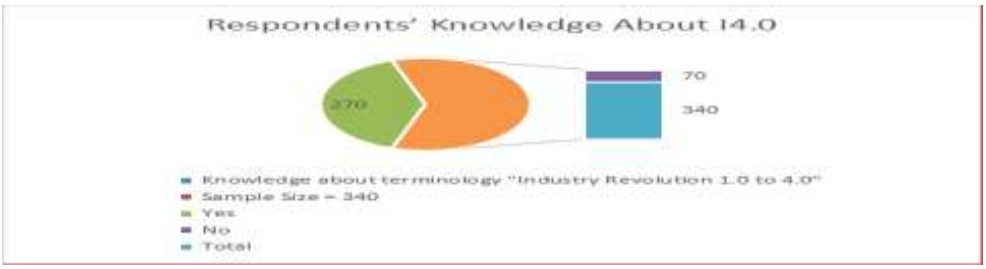
Qualification (Sample Size =340)	Frequency	Percentage
Higher Secondary / PUC / +2	20	06.00
Graduation	40	12.00
Post Graduation	220	65.00
M.Phil / Ph.D	60	18.00
Total	**340**	**100.00**



[Figure 3: Respondents Qualification-wise Frequency Distribution]

[Table 4: Respondents' knowledge about the Terminology I4.0]

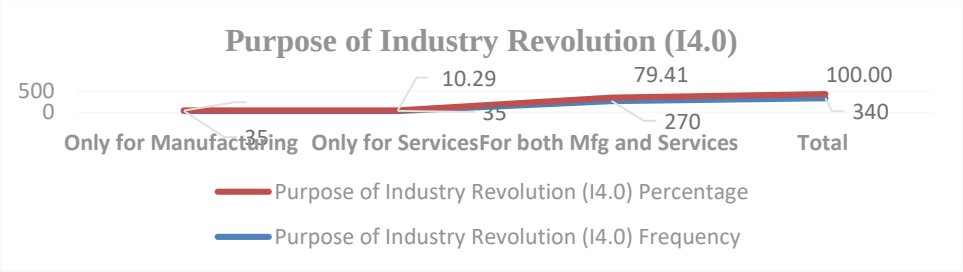
Knowledge about terminology "Industry Revolution 1.0 to 4.0"		
Sample Size = 340	**Industry 4.0 (Heard About)**	**Percentage**
Yes	270	79
No	70	21
Total	**340**	**100**



[Figure 4: Respondents' knowledge about the Terminology I4.0]

[Table 5: Respondents' knowledge about the Purpose of I4.0]

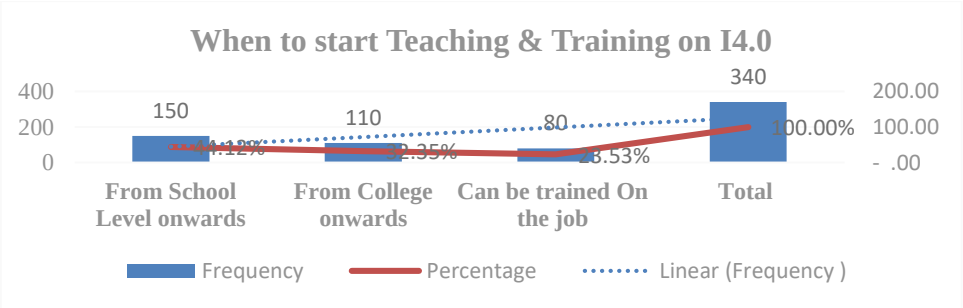
Purpose of Industry Revolution (I4.0)		
Purpose (Sample Size = 340)	**Frequency**	**Percentage**
Only for Manufacturing	35	10.29
Only for Services	35	10.29
For both Mfg and Services	270	79.41
Total	**340**	**100.00**



[Figure 5: Respondents' knowledge about the Purpose of I4.0]

[Table 6: The level of education to begin the I4.0 with]

When to Start Teaching and Training of I4.0		
The Phases Training on I4.0 (Sample Size = 340)	**Frequency**	**Percentage**
From School Level onwards	150	44.12
From College onwards	110	32.35
Can be trained On the job	80	23.53
Total	**340**	**100.00**

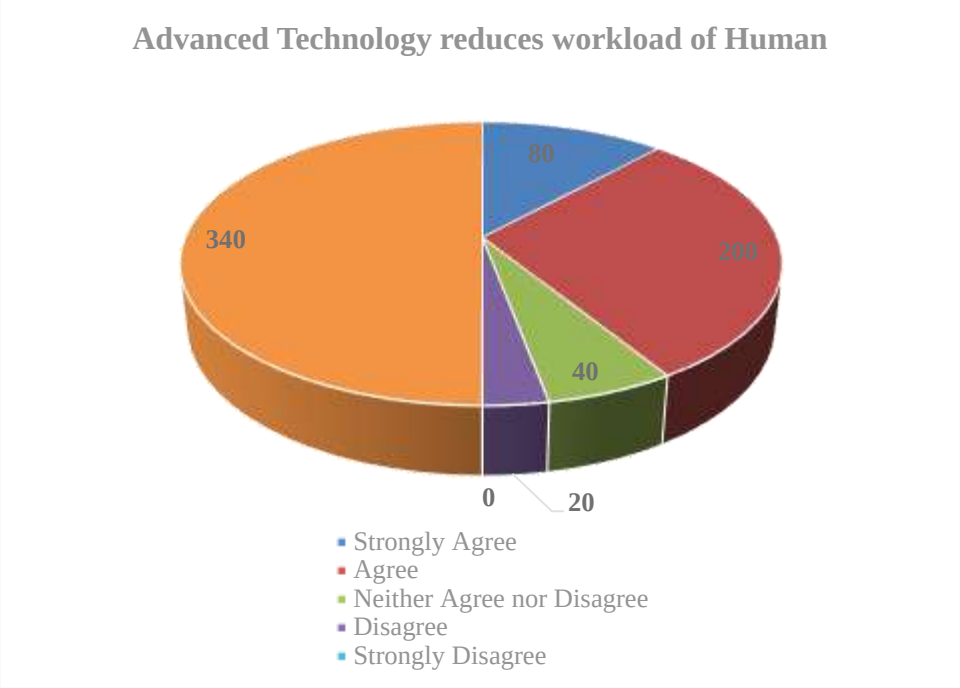


[Figure 6: The level of education to begin the I4.0 with]

[Table 7: Does Advanced Technology Reduce Work Load of Human?]

Advanced Technology reduces the workload of Human		
Advance Technology reduces workload of human	**Frequency**	**Percentage**
Strongly Agree	80	23.53
Agree	200	58.82
Neither Agree nor Disagree	40	11.76

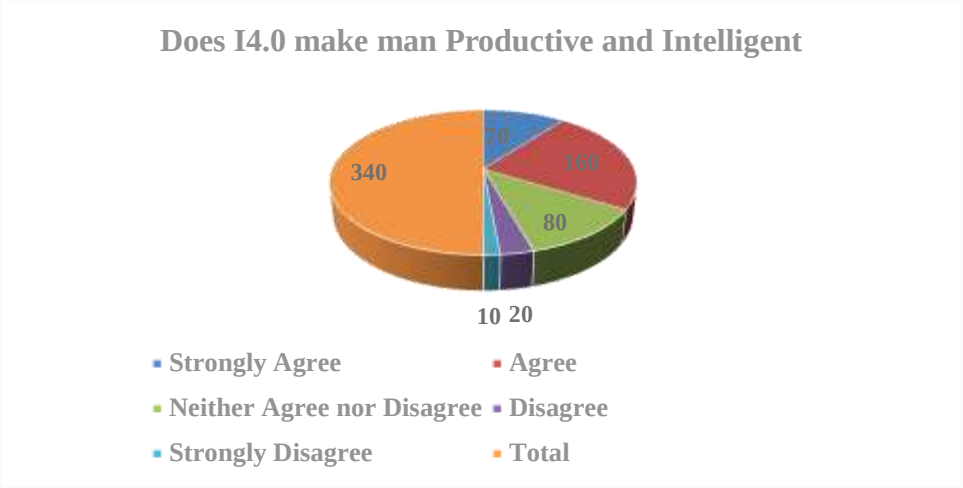
Disagree	20	5.88
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 7: Does Advanced Technology Reduce Work Load of Human?]

[Table 8 : Does I4.0 make men more intelligent and productive?]

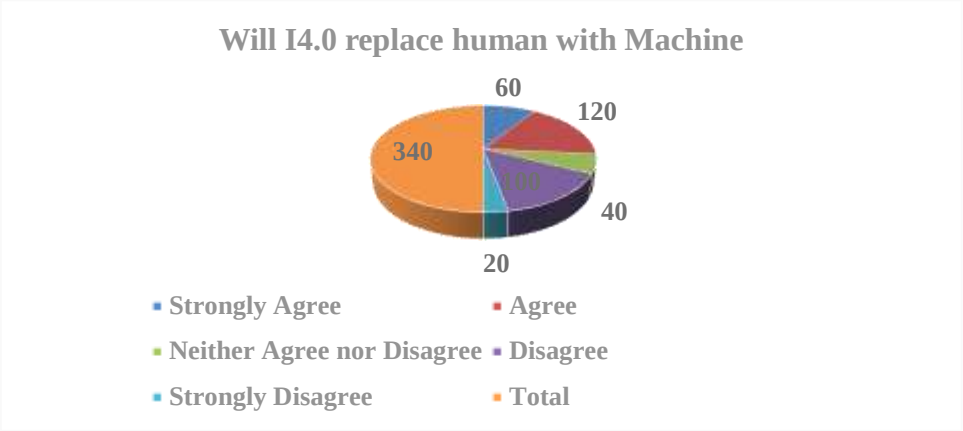
I4.0 makes men more intelligent and productive		
I4.0 ensures productivity	**Frequency**	**Percentage**
Strongly Agree	70	20.59
Agree	160	47.06
Neither Agree nor Disagree	80	23.53
Disagree	20	5.88
Strongly Disagree	10	2.94
Total	**340**	**100.00**



[Figure 8 : Does I4.0 make men more intelligent and productive?]

[Table 9: Will I4.0 replace the human with machines or devices?]

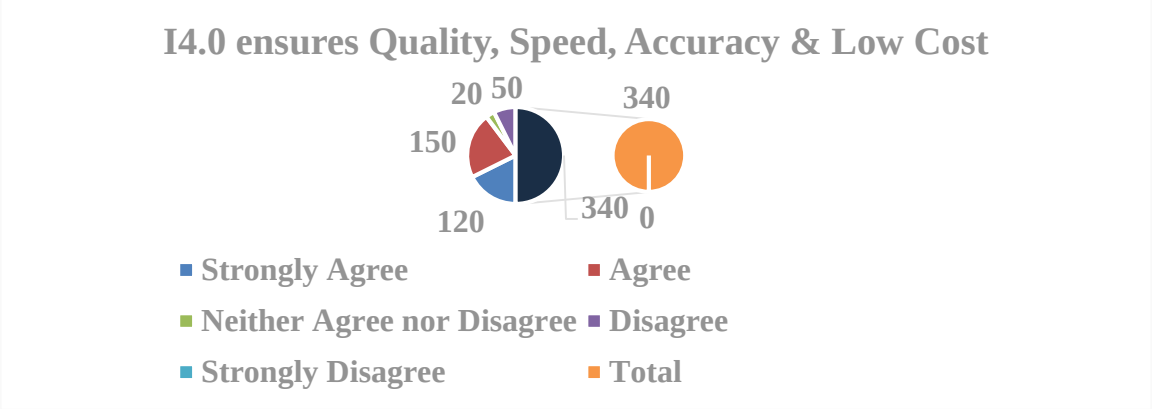
Will I4.0 replace the human with machines or devices		
Replaces human with machines	**Frequency**	**Percentage**
Strongly Agree	60	17.65
Agree	120	35.29
Neither Agree nor Disagree	40	11.76
Disagree	100	29.41
Strongly Disagree	20	5.88
Total	**340**	**100.00**



[Figure 9: Will I4.0 replace the human with machines or devices?]

[Table 10: Does I4.0 ensure Quality, Speed, Accuracy & Low Cost?]

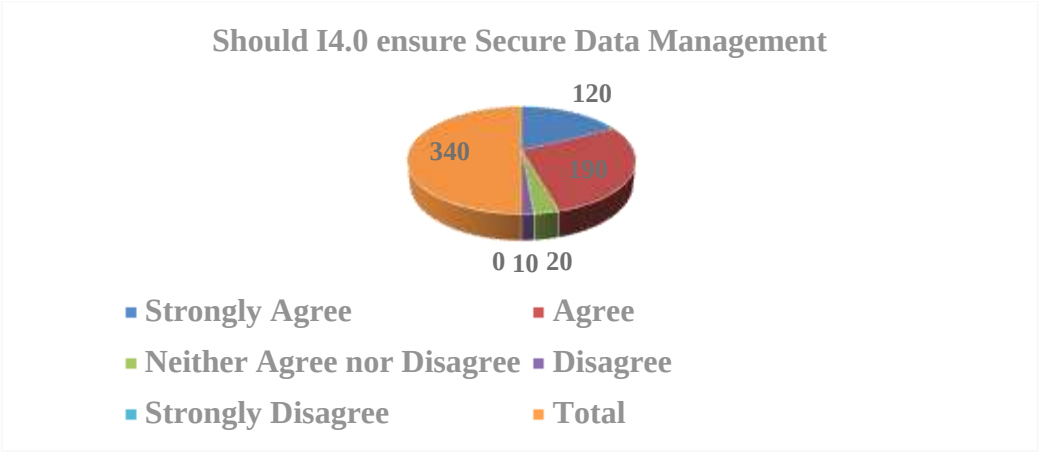
Does I4.0 ensure Quality, Speed, Accuracy & Low Cost		
I4.0 ensures Quality, Speed, Accuracy & Low Cost	**Frequency**	**Percentage**
Strongly Agree	120	35.29
Agree	150	44.12
Neither Agree nor Disagree	20	5.88
Disagree	50	14.71
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 10: Does I4.0 ensure Quality, Speed, Accuracy & Low Cost?]

[Table 11: Should I4.0 ensure Secure Data Management of Services?]

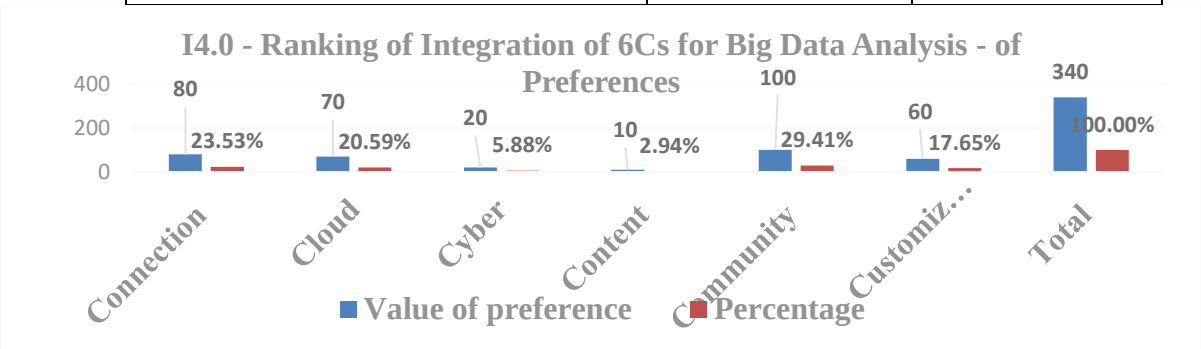
Should I4.0 ensure Secure Data Management of services		
I4.0 Nee of Efficient Data Management	**Frequency**	**Percentage**
Strongly Agree	120	35.29
Agree	190	55.88
Neither Agree nor Disagree	20	5.88
Disagree	10	- .00
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 11: Should I4.0 ensure Secure Data Management of Services?]

[Table 12: Ranking of integration of 6 Cs for Big Data Analysis]

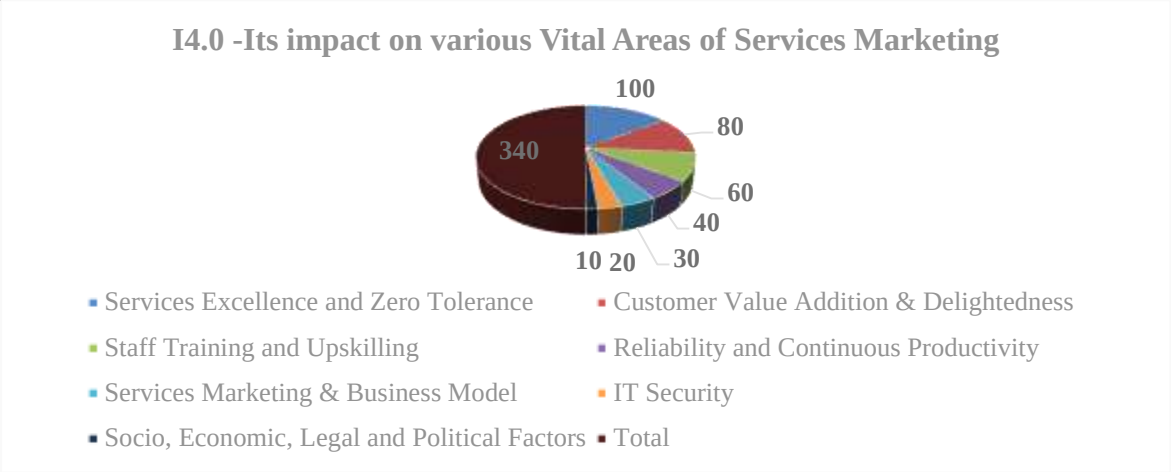
I4.0 - Ranking of Integration of 6Cs for Big Data Analysis		
I4.0 Ranking of 6Cs for Data Analysis	**Value/Rank in Order**	**Percentage**
Connection	60	17.65
Cloud	70	20.59
Cyber	20	5.88
Content	10	2.94
Community	100	29.41
Customization (Personalizatio)	80	23.53
Total	**340**	**100.00**



[Figure 12: Ranking of integration of 6 Cs for Big Data Analysis]

[Table 13: I-4.0 Its impact on different vital areas of Services Marketing]

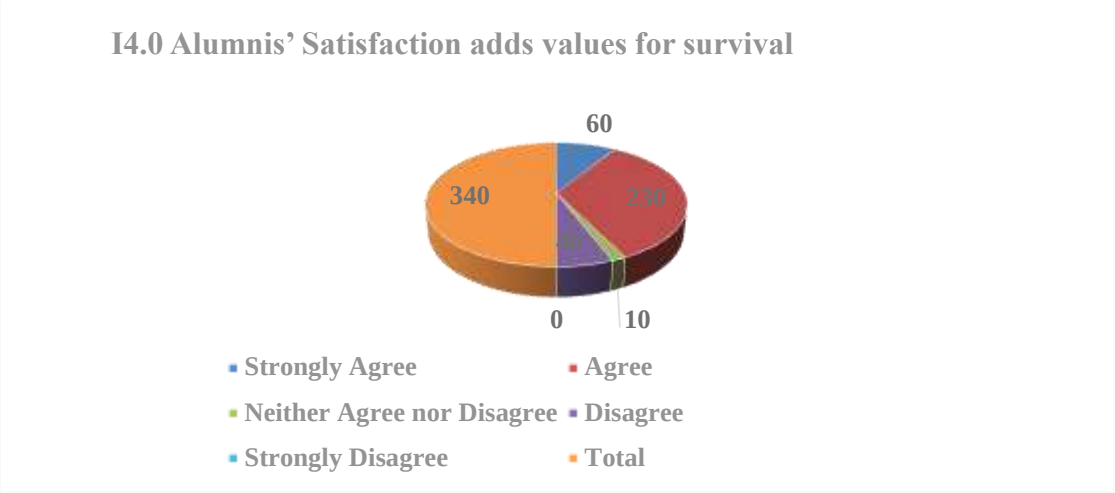
I4.0-Its impact on different vital areas of Services Marketing		
I4.0 Ranking of preferences	**Ranking of preferences**	**Percentage**
Services Excellence and Zero Tolerance	100	29.41
Customer Value Addition & Delightedness	80	23.53
Staff Training and Upskilling	60	17.65
Reliability and Continuous Productivity	40	11.76
Services Marketing & Business Model	30	8.82
IT Security	20	5.88
Socioeconomic, Legal and Political Factors	10	2.94



[Figure 13: I4.0 - Impact on different vital areas of Services Marketing]

[Table 14: 14.0: Does yesteryear's alumni satisfaction help the Institutions' survival]

I4.0 - Alumni Satisfaction exceeds the infrastructure including technology	**Frequency**	**Percentage**
Strongly Agree	60	17.65
Agree	230	67.65
Neither Agree nor Disagree	10	2.94
Disagree	40	11.76
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 14: 14.0: Does yesteryear's alumni satisfaction help the Institutions' survival]

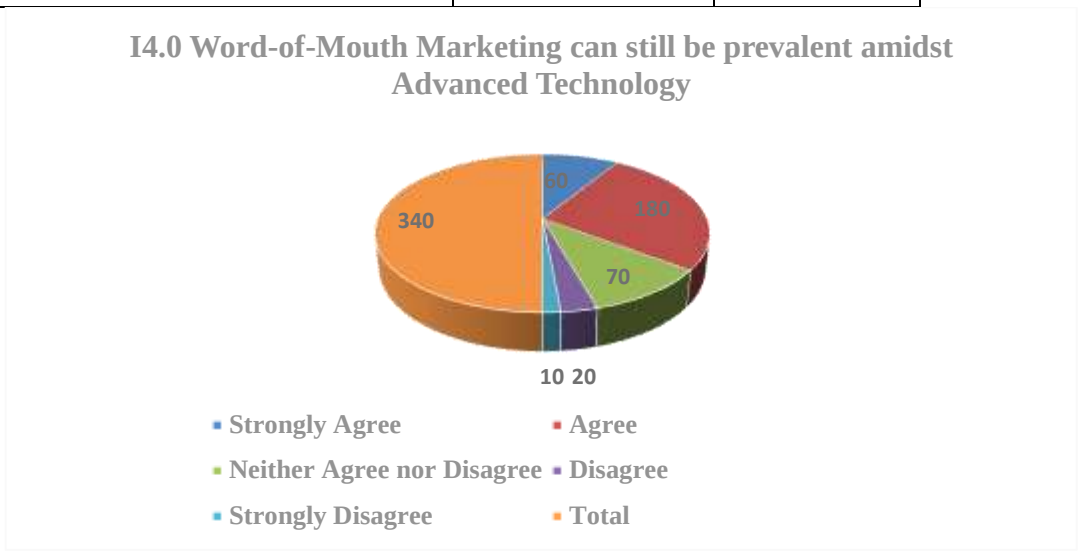
[Table15: 14.0: Ethical way of Marketing for meeting the Customer's Expectations]

I4.0 - Ethical way of doing with technology - Meeting Customers Expectations	**Frequency**	**Percentage**
Strongly Agree	80	23.53
Agree	190	55.88
Neither Agree nor Disagree	20	5.88
Disagree	30	8.82
Strongly Disagree	20	5.88
Total	**340**	**100.00**

[Figure15: 14.0: Ethical way of Marketing for meeting the Customer's Expectations]

[Table16: 14.0: Word-of-Mouth Marketing amid of Advanced Digital Technology]

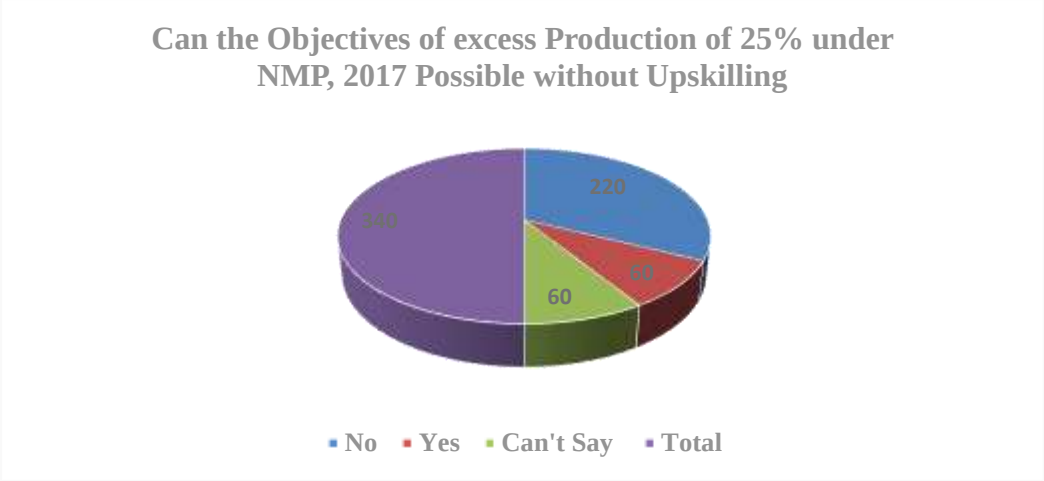
I4.0 - Traditional Practices can still be prevalent in Marketing	**Frequency**	**Percentage**
Strongly Agree	60	17.65
Agree	180	52.94
Neither Agree nor Disagree	70	20.59
Disagree	20	5.88
Strongly Disagree	10	2.94
Total	**340**	**100.00**



[Figure 16: I4.0 - Word-of-Mouth Marketing amid of Advanced Digital Technology]

[Table 17: I4.0 - Is the National Manufacturing Policy 2017's target possible without Skill Enhancement]

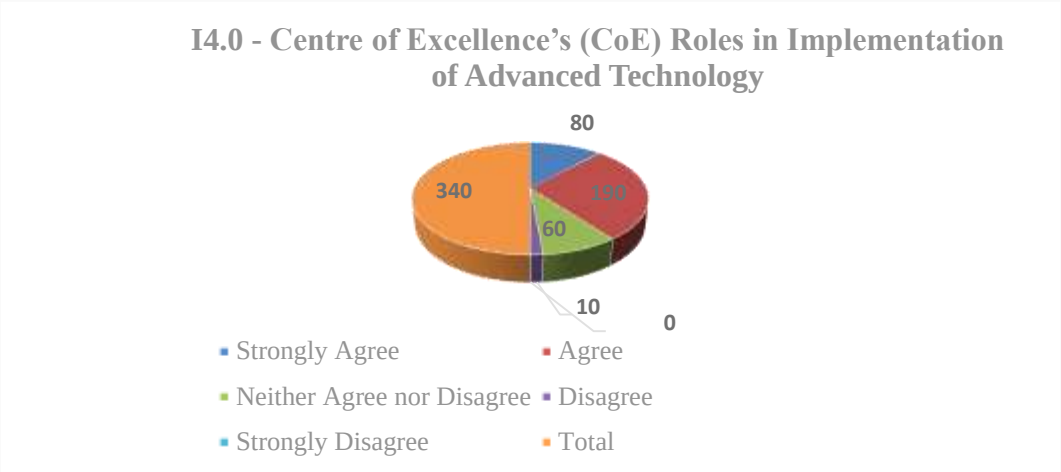
I4.0 - Role of Upskilling for achieving the Objective of NMP, 2017	**Frequency**	**Percentage**
No	220	64.71
Yes	60	17.65
Can't Say	60	17.65
Total	**340**	**100.00**



[Figure 17: I4.0 - Is the National Manufacturing Policy 2017's target possible without Skill Enhancement]

[Table 18: I4.0 - Role of Centre for Excellence (CFE) on the Implementation of I4.0]

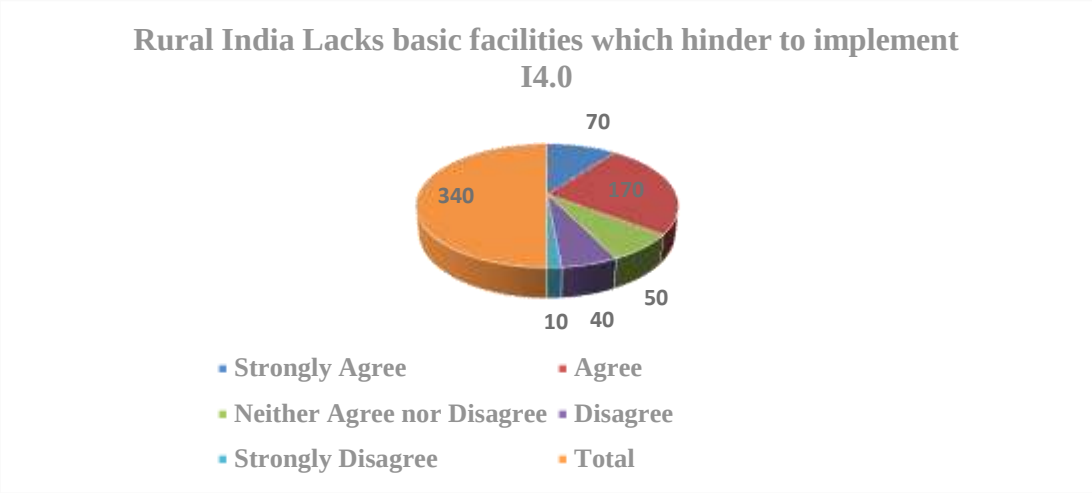
I4.0 - CFE's Roles in Advanced Technology Implementation	**Frequency**	**Percentage**
Strongly Agree	80	23.53
Agree	190	55.88
Neither Agree nor Disagree	60	17.65
Disagree	10	2.94
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 18: I4.0 - Role of Centre for Excellence (CFE) on the Implementation of I4.0]

[Table 19: I4.0 - Need of Strengthening Rural India's Education for I4.0]

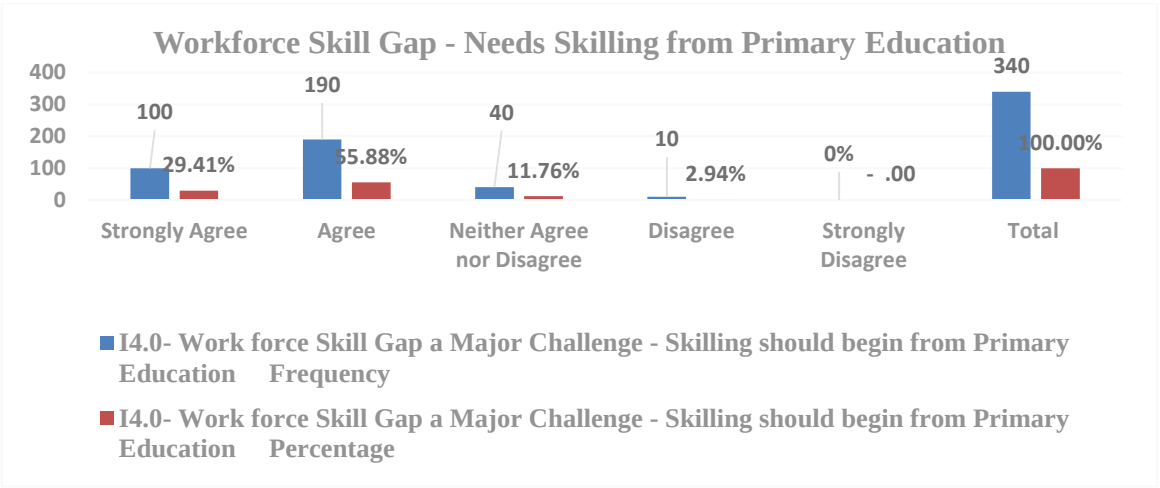
I4.0 - Rural India Lacks basic facilities which hinder to implement I4.0	**Frequency**	**Percentage**
Strongly Agree	70	20.59
Agree	170	50.00
Neither Agree nor Disagree	50	14.71
Disagree	40	11.76
Strongly Disagree	10	2.94
Total	**340**	**100.00**



[Figure 19: I4.0 - Need of Strengthening Rural India's Education for I4.0]

[Table 20: I4.0 - Workforce Skill Gap a Major Challenge for I4.0]

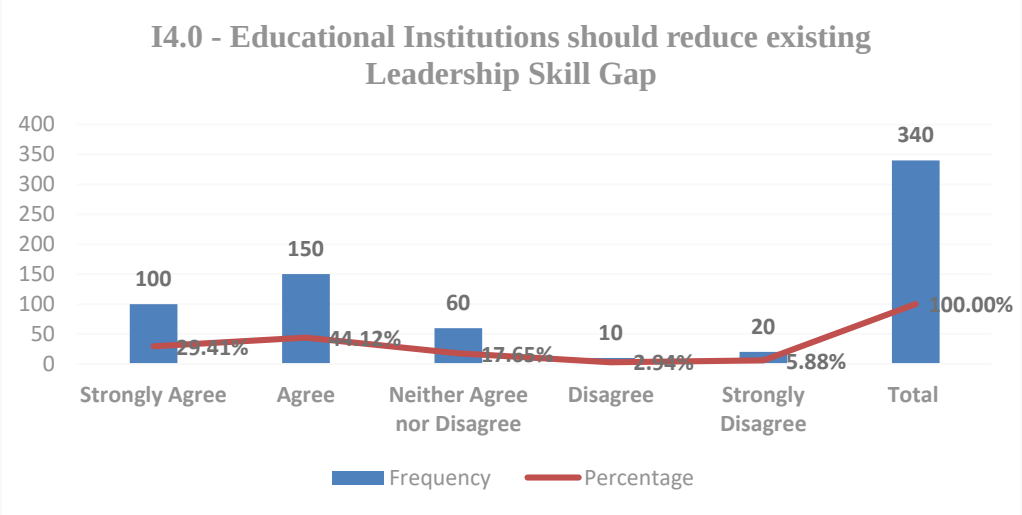
I4.0 - Workforce Skill Gap - Needs Skilling from Primary Education	**Frequency**	**Percentage**
Strongly Agree	100	29.41
Agree	190	55.88
Neither Agree nor Disagree	40	11.76
Disagree	10	2.94
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 20: I4.0 - Workforce Skill Gap a Major Challenge for I4.0]

[Table 21: I4.0 - Skilling should start from Top down to reduce Leadership Skill Gap in Institutions I4.0]

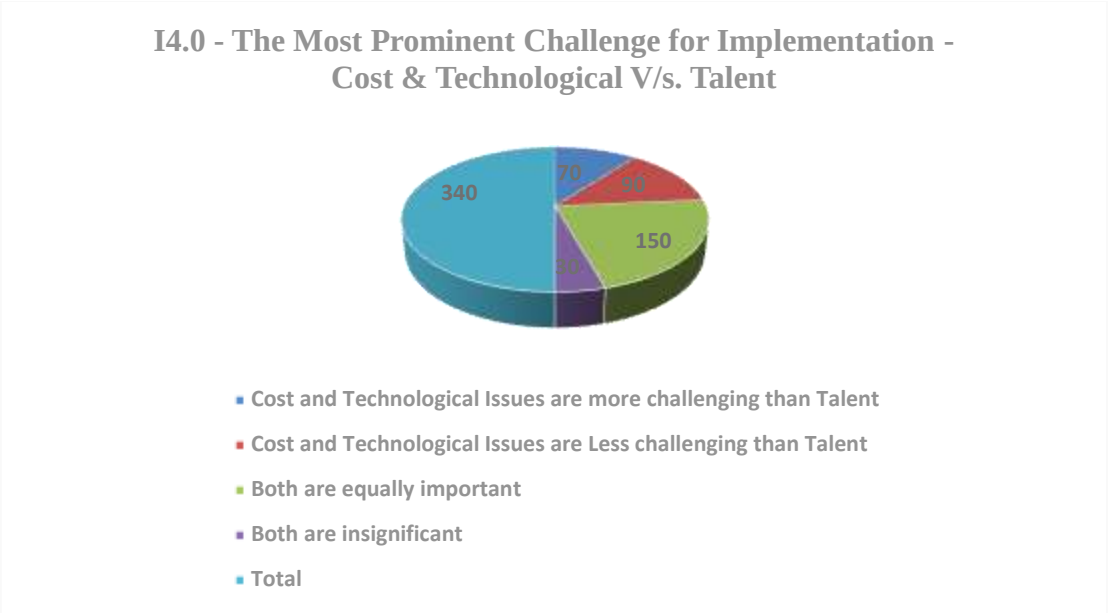
I4.0 - Educational Institutions should reduce the existing Leadership Skill Gap	**Frequency**	**Percentage**
Strongly Agree	100	29.41
Agree	150	44.12
Neither Agree nor Disagree	60	17.65
Disagree	10	2.94
Strongly Disagree	20	5.88
Total	**340**	**100.00**



[Figure 21: I4.0 - Skilling should start from Top down to reduce Leadership Skill Gap in Institutions I4.0]

[Table 22: I4.0 - Challenge in Implementation - Cost Technological V/s. Talent I4.0]

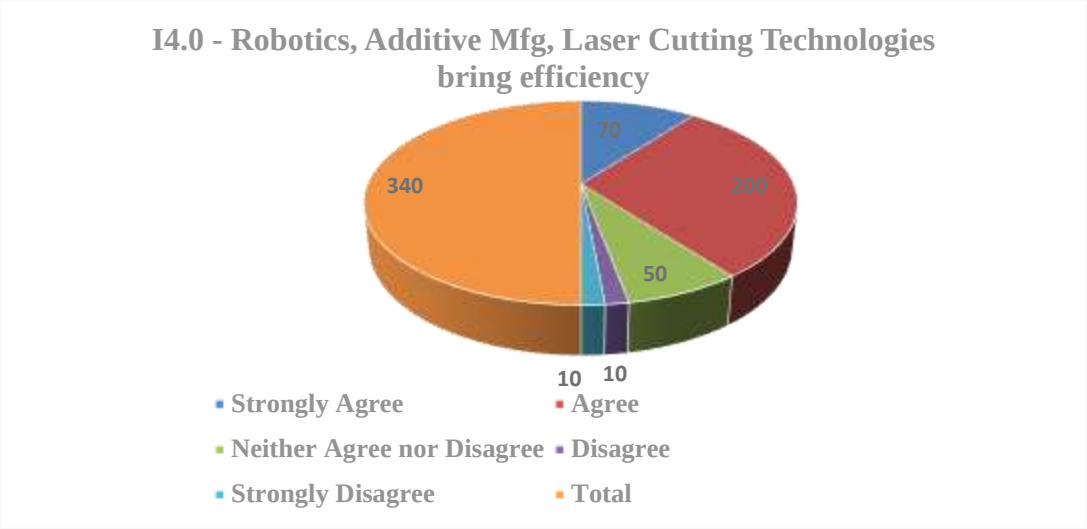
I4.0 - Challenge in implementation - Cost-Technological V/s. Talent	**Frequency**	**Percentage**
Cost and Technological Issues are **more** challenging than Talent	70	20.59
Cost and Technological Issues are **Less** challenging than Talent	90	26.47
Both are equally important	150	44.12
Both are insignificant	30	8.82
Total	**340**	**100.00**



[Figure 22: I4.0 - Challenge in Implementation - Cost Technological V/s. Talent I4.0]

[Table 23: I4.0 - Robotics, Additive Mfg, Laser Cutting Technologies etc., bring efficiency in I4.0]

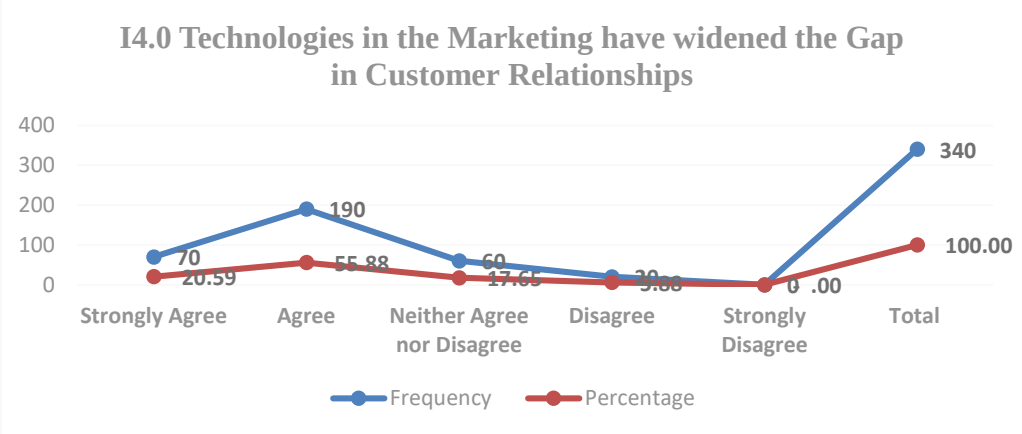
I4.0 - Role of Robotics, Additive Mfg., Laser Cutting Technologies Provide Efficient Performance	**Frequency**	**Percentage**
Strongly Agree	70	20.59
Agree	200	58.82
Neither Agree nor Disagree	50	14.71
Disagree	10	2.94
Strongly Disagree	10	2.94
Total	**340**	**100.00**



[Figure 23: I4.0 - Robotics, Additive Mfg, Laser Cutting Technologies etc., bring efficiency in I4.0]

[Table 24: I4.0 - Technologies brought Customer Values down drastically]

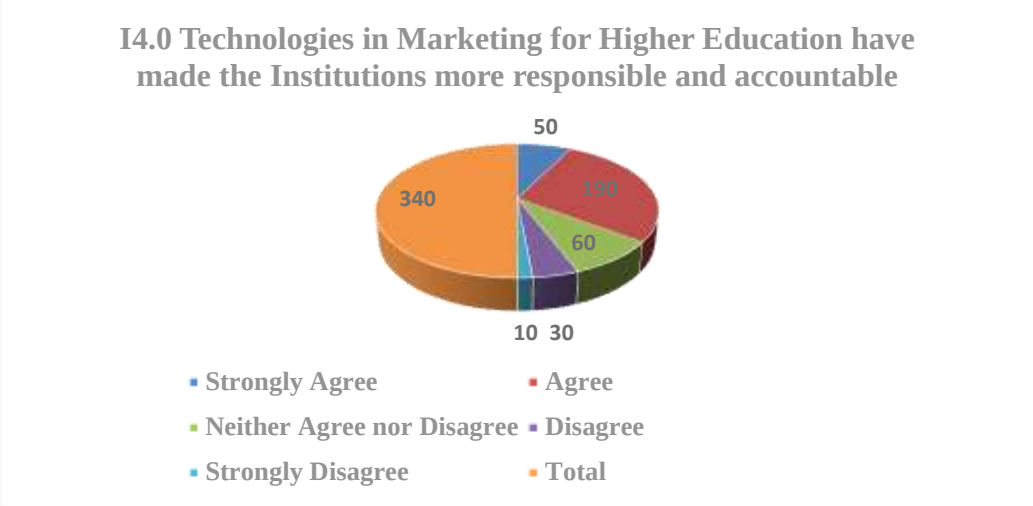
I4.0 - Technologies in Marketing have widened the gap in Customer Relationships	**Frequency**	**Percentage**
Strongly Agree	70	20.59
Agree	190	55.88
Neither Agree nor Disagree	60	17.65
Disagree	20	5.88
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 24: I4.0 - Technologies brought Customer Values down drastically]

[Table 25: I4.0 - Technologies in Marketing for HE has enhanced responsibilities and accountability of the Management]

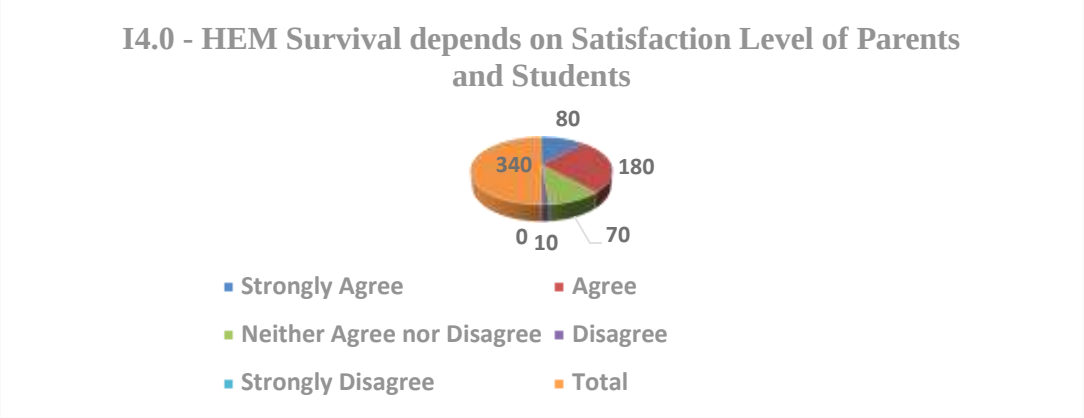
I4.0 - Technologies in Marketing have made the Institutions more responsible and accountable	Frequency	Percentage
Strongly Agree	50	14.71
Agree	190	55.88
Neither Agree nor Disagree	60	17.65
Disagree	30	8.82
Strongly Disagree	10	2.94
Total	**340**	**100.00**



[Figure 25: I4.0 - Technologies in Marketing for HE has enhanced responsibilities and accountability of theManagement]

[Table 26: I4.0 - Survival of Institutions depends on Satisfaction level of parents and students]

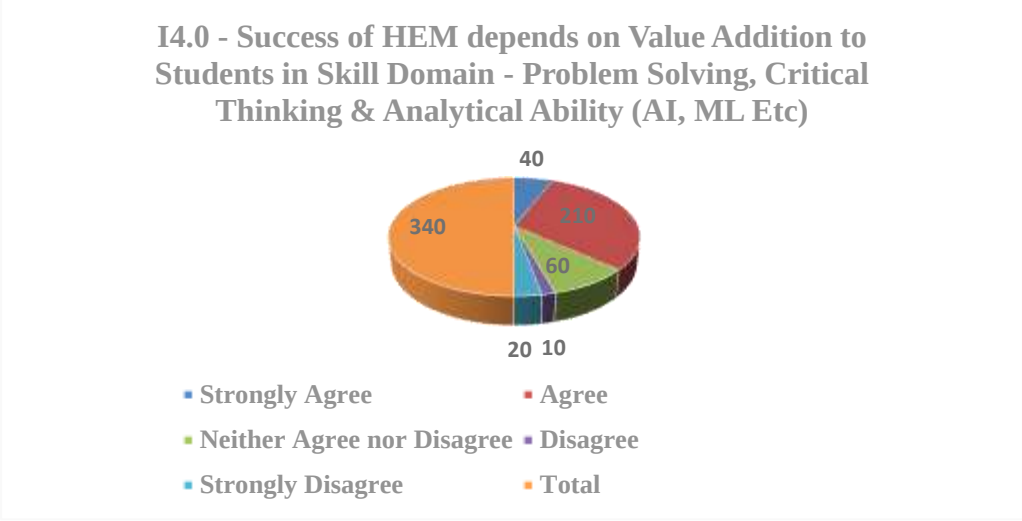
I4.0 - HEM Survival depends on Satisfaction Level of Parents and Students	Frequency	Percentage
Strongly Agree	80	23.53
Agree	180	52.94
Neither Agree nor Disagree	70	20.59
Disagree	10	2.94
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Table 26: I4.0 - Survival of Institutions depends on Satisfaction level of parents and students]

[Table 27: I4.0 - Success of HEM depends on Value Addition Problem Solving, Critical Thinking and Analytical Ability]

I4.0 - Success of HEM - value addition to students in Skill Domain - Problems Solving, Critical Thinking and Analytical Ability (AI & ML help)	**Frequency**	**Percentage**
Strongly Agree	40	11.76
Agree	210	61.76
Neither Agree nor Disagree	60	17.65
Disagree	10	2.94
Strongly Disagree	20	5.88
Total	**340**	**100.00**

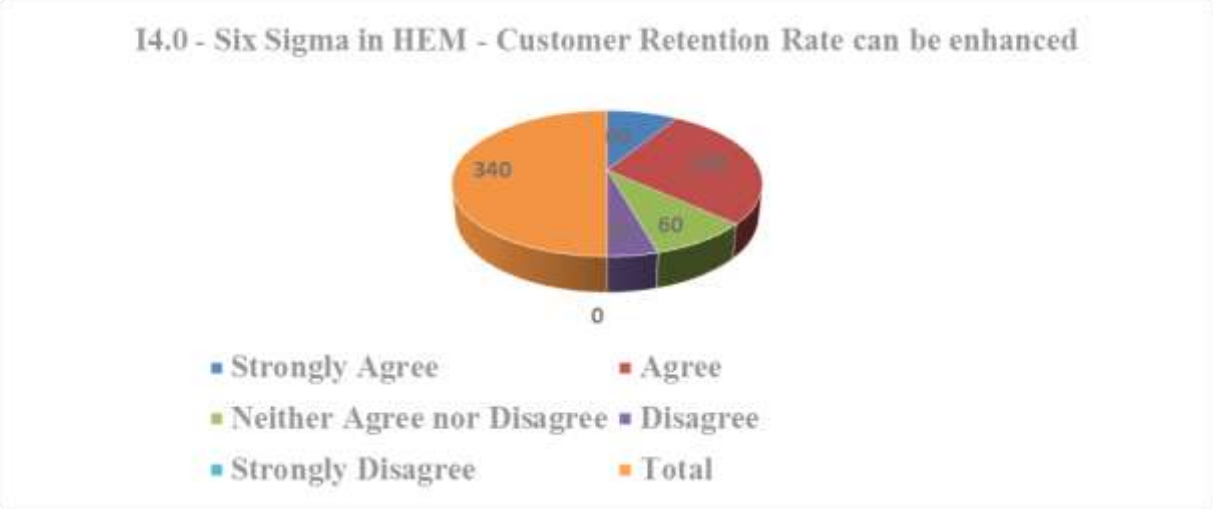


[Figure 27: I4.0 - Success of HEM depends on Value Addition Problem Solving, Critical Thinking and

Analytical Ability]

[Table 28: I4.0 - Customer Retention Rate ensures Six Sigma in Digital Marketing for HE - (Overall Quality (Performance) = 99.99966%]

I4.0 - Six Sigma in HEM to be followed for Retention and enhancing Brand Image and reduce churn rate	**Frequency**	**Percentage**
Strongly Agree	60	17.65
Agree	190	55.88
Neither Agree nor Disagree	60	17.65
Disagree	30	8.82
Strongly Disagree	0	- .00
Total	**340**	**100.00**



[Figure 28: I4.0 - Customer Retention Rate ensures Six Sigma in Digital Marketing for HE - (Overall Quality (Performance = 99.99966%)]

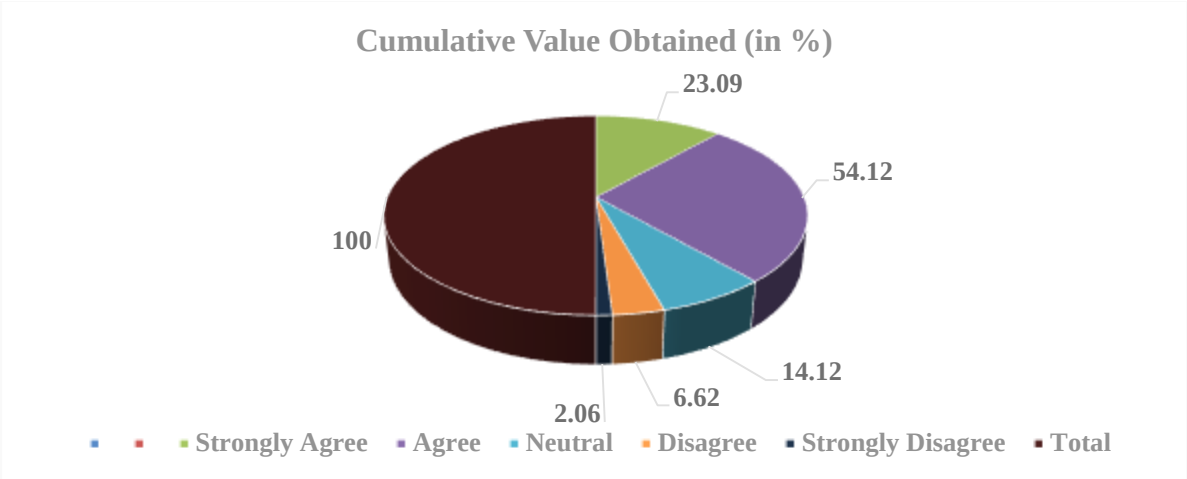
[Table 29: I4.0 - Cumulative Analysis of the Likert Scale Measurement and Values

Sample Size: 340, Number of Questions = 28]

Scale Measure	Value	Achieved Score	Total Value of Achieved Score (Scale Value)	Cumulate Score (Total Score*Scale Value)	Value Obtained (in %)
Strongly Agree	5	1570	7850	34000	23.09
Agree	4	3680	14720	27200	54.12
Neutral	3	960	2880	20400	14.12

Disagree	2	450	900	13600	6.62
Strongly Disagree	1	140	140	6800	2.06
Total		6800	26490	102000	100.00

[The values measured on the Likert Scale depicted here show the consistency of positive correlations of the variables].



[Figure 29: I4.0 - Cumulative Analysis of the Likert Scale Measurement and Values

Sample Size: 340, Number of Questions = 28]

Data Interpretations

[Sample size: 340 = 34 higher education institutions = 12 higher secondary schools + 15 colleges + 07 universities = teaching & non-teaching staff of techno savvy]

[01] Table & Figure 1. Respondents' gender-wise frequency distribution: 180 (52.95%) male &

160 (47.05%) female were participated in the survey.

[02] Table & Figure 2. Respondents' age-wise frequency distribution: The respondents were of four age brackets - 130 (38.24%) each were of 20-29 & 30-39 age brackets, 50 (14.70%) were of the age group of 40-49, and 30 (8.82%) belonged to 50-59 age group.

[03] Table & Figure 3. Respondents' qualification-wise frequency distribution: 220 (64.70%) respondents were post graduates; 60 (17.64%) were Ph.D., 40 (11.76%) were graduates, and 20 (5.90%) were of higher secondary.

[04] Table & Figure 4. Respondents' knowledge about the terminology I4.0: 220 (64.71%) participants had thorough knowledge about I4.0, and 120 (35.29%) had limited knowledge about I4.0.

[05] Table & Figure 5. Respondents' knowledge about the purpose of I4.0: 270 (79.42%) participants had a thorough understanding of all the prior phases of Industry Revolution (I1.0 to I4.0); but 70 (20.58%) participants were not much familiar with.

[06] Table & Figure 6. The level of education to begin the I4.0 with: 150 (44.11%) participants were of the opinion that it should start from primary education itself. 110 (32.35%) had opined that it can be

implemented at the college level, and the remaining 80 (23.54%) were of the opinion that the teaching, learning, and training could be done on the job.

[07] Table & Figure 7. Does advanced technology reduce the workload of humans?: 280 (82.34%) had supported the view, while 40 (11.78%) remained neutral and 20 (5.88%) had disagreed with the view.

[08] Table & Figure 8. Does I4.0 make men more intelligent and productive transforming the pressure from the body to the brain?: 230 (67.64%) had agreed, 80 (23.53%) remained neutral, and the remaining 30 (8.83%) had disagreed.

[09] Table & Figure 9. Will I4.0 replace the human with machines or devices?:180 (52.94%) had supported the view, 120 (36.30%) disagreed on; while 40 (19.76) remained neutral.

[10] Table & Figure 10. Does I4.0 ensure quality, speed, accuracy & low cost?: 270 (79.42%) respondents had supported the view, 20 (5.88%) remained neutral and the remaining 50 (14.70) had expressed their disagreement.

[11] Table & Figure 11. Should I4.0 ensure Secure Data Management of Services?: 310 (91.18%) had agreed on the view, whereas 20 (5.88%) remained neutral, and the remaining 10 (2.94%) had disagreed.

[12] Table & Figure 12. Ranking of integration of 6 Cs - connection, cloud, cyber, content, community & customization for Big Data Analysis: 240 (70.59%) had reinstated the importance of 6Cs, 40 (11.76%) remained neutral and 60 (17.65%) had disagreed.

[13] Table & Figure 13. I-4.0 Its impact on different vital areas of Services Marketing: 270 (79.41%) had supported, while 40 (11.76%) remained neutral, and 30 (8.83%) had disagreed on.

[14]Table & Figure 14. 14.0: Does yesteryear's alumni satisfaction help the Institutions' survival?: 290 (85.29%) responded with 'Yes, while 30 (8.83%) remained neutral, and 20 (6.88%) said 'No'

[15]Table & Figure15. 14.0: Ethical way of Marketing for meeting the Customer's Expectations: 270 (79.41%) had supported the view, 20 (5.88%) remained neutral, and 50 (14.71%) had opposed the view.

[16]Table & Figure 16. I4.0 - Relevance of Word-of-Mouth Marketing in the midst of advanced digital technology: 240 (70.58%), had agreed on the view, while 70 (20.59%), remained neutral, and 30 (8.83%) disagreed.

[17]Table & Figure 17. I4.0 - Is the National Manufacturing Policy 2017's target possible without Skill Enhancement: 220 (64.70%) had opined that it is impossible to achieve the objective without skill enhancement of the manpower; whereas 60 (17.65%) remained neutral, and the remaining 60 (17.65%) responded with Yes.

[18]Table & Figure 18. I4.0 - Role of Centre for Excellence (CFE) on the Implementation of

I4.0: 270 (79.41%) had reinstated the role of CFE in the implementation of I4.0, while 60 (17.65%) remained neutral, and the remaining 10 (2.94%) disagreed on.

[19] Table & Figure 19. I4.0 - Need of Strengthening Rural India's Education for I4.0: 240 (70.59%) had agreed, whereas 40 (11.76%) remained neutral, and the remaining 10 (2.94%) disagreed on.

[20] Table & Figure 20. I4.0 - Workforce Skill Gap a Major Challenge for I4.0: 290 (85.3%) had agreed, while 40 (11.76%) remained neutral, and the rest 10 (2.94%) disagreed.

[21]Table & Figure 21. I4.0 - Skilling should start from top-down to reduce the leadership skill

The gap in institutions I4.0: 250 (73.52%) had agreed, 60 (17.65%) remained neutral and the

remaining 30 (8.83%) disagreed.

[22] Table & Figure 22. I4.0 - Challenge in Implementation - Cost-Technological V/s. Talent I4.0: 70 (20.59%) opined that cost-technology is more challenging, 90 (26.47%) opined that talent issues are more challenging than the former; whereas 150 (44.12%) had opined that both are equally important and the remaining 30 (08.82%) were of the opinion that both are insignificant.

[23]Table & Figure 23. I4.0 - Robotics, Additive Mfg, Laser Cutting Technologies, etc., bring efficiency in I4.0: 310 (91.18%) participants had agreed, while the remaining 30 (8.82%) had disagreed on.

[24] Table & Figure 24. I4.0 - Technologies brought Customer Values down drastically: 260 (76.47%), while 60 (17.64%) remained neutral and the remaining **20 (6.88%).**

[25]Table & Figure 25. I4.0 - Technologies in Marketing for HE has enhanced responsibilities and accountability of the Management: 240 (70.58%), while 60 (17.64) were neutral and the remaining 40 (11.77%) disagreed.

[25] Table & Figure 26. I4.0 - Survival of Institutions depends on the Satisfaction level of Parents and students: 260 (76.47%) had agreed, whereas 70 (20.59%) remained neutral, and the remaining 10 (2.94%) had disagreed.

[27]Table & Figure 27. I4.0 - Success of HEM depends on Value Addition, Problem Solving, Critical Thinking and Analytical Ability: 250 (73.53%) had agreed on this, whereas 60 (17.65%) remained neutral, and the remaining 30 (8.82%) had disagreed.

[28]Table & Figure 28. I4.0 - Customer Retention Rate ensures Six Sigma in Digital Marketing for Higher Education (Overall Quality (Performance) = 99.99966%: 250 (73.3%) had agreed, 60 (17.65%) remained neutral and the remaining 30 (8.82%) had disagreed.

[29]Table & Figure 29. I4.0 - Cumulative Analysis of the Likert Scale Measurement on Values = Sample Size: 340, Number of Questions = 28: Overall score value of scale 'Strongly Agree & Agree on shows 77.21%; whereas 14.12% respondents were neutral in their approach the remaining 8.68% had disagreed. The cumulative positive responses in proportion to the Individual responses to the specific questions substantiate the view expressed by the researchers in the past as well as the respondents on the survey conducted for collecting the samples.

Acknowledgement

The researchers hereby express their heartfelt gratitude to the all the researchers who had immensely contributed to make available relevant quality publications as the secondary data source and also the respondents, the selected teaching and non-teaching staff of the higher secondary schools, the colleges, and the universities for their active involvement by expressing their unbiased and genuine opinions towards the questionnaire. The 'Snowball method' used by the researchers to collect the required samples

from the respective institutions was proved to be effective. The research scholar hereby expresses his sincere gratitude to his guide, Dr. Senthil Kumar for his constant support and unconditional motivation in completing this paper.

Conclusion

The functions and structures of marketing have been evolving swiftly with the dynamic technological advancement. The secondary data collected from relevant quality journals and the responses obtained from the respondents on the questionnaire have shown considerable consistency and relevance to be relied upon the existing trend in the market towards promotional activities of marketing for education under the Industry 4.0 (I4.0). It has been evinced from the investigation through out this research that numerous researchers are required to be carried out in the realm of educational marketing as a very few researches have carried out in services marketing in respect of I4.0. The sustainable integration of Science, Technology and Innovation (STI) in the Cyber - physical system (CPS) has great impact on the marketing for education under Industry 4.0.

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