

Exploring the perception of Higher Secondary Science Students for their Career Objective: a case study in Western Odisha

¹Pramod Kumar Debta , ²Karunakar Patra

¹Research Scholar, Faculty of Management, BPUT, Rourkela, Odisha

²Department of MBA, RIMS, Rourkela, Odisha

Abstract

Introduction- Career choice should be based on practical measures that rely on appropriate information and experience that depend on an analytical approach for choosing best for students based on their capabilities, interest and their skills rather than following the footsteps of others. Because it is one of the most vital elements that transform lives and should be taken seriously without being influenced.

Objective- The motive of the study is to determine the perception of the higher secondary science student for making a career choice. The research also explores the career management process that performs a vital role in formulating appropriate career decisions for the higher secondary students for their bright future and sustainable growth.

Methodology- The research utilizes empirical analysis methods based on primary research. The total number of respondents in the research are 152 students willing to share their opinion who are studying in the higher secondary and living in Western Odisha. The paper uses a Random Sampling Method based on a primary approach that relies on standard questionnaires. Statistical tools for extracting and analyzing the data in the study use the ANOVA approach.

Results- The result prominently favors the role of career management and influencing factors that reveal a significant and promising impact on students' perception while making career choices.

Keywords- Career Choice, Career interest, Career Management Process, Western Odisha and education, STEM as a career choice.

1. Introduction

India in recent years introduced a National Education Policy (NEP) 2020 that endeavors inclusive and quality education in an egalitarian manner. With the ambition to formulate India as a global knowledge hub by implementing an inclusive, participatory and holistic approach to reforming the existing educational structure. New education policy focuses on a multi-disciplinary manner intended to bridge the gap in the current education scenario to meet the needs of the future based on technology analytical thinking, innovation, and so on. It opens the door for new learning as it robustly impacts transforming the learning environment and the procedure of learning for the students.

Science, Technology, Engineering and Mathematics (STEM) are surging sectors and constitute the important ingredients of education. Under the NEP it provides a convenient pathway to compile stem learning and procedure based on upgraded mode, it strengthens the STEM education procedure by introducing several strata of learning. As it encourages empirical research, experiential learning, analytical thinking based on problem-solving, discussion-based analysis based on critical thinking, and a holistic type of learning. It also introduced cutting-edge technology like machine learning, artificial intelligence,

computational thinking, and design thinking as a bedrock science approach in the foundational years of education.

Career Choice for Higher Secondary Science Student

Career Choice is one of the most critical milestones that play a significant role in students' life that involves self-analysis, logical thinking, and then comes to make decisions. This choice related to a career can be influenced by the perception of parents, friends, relatives, teachers, or other external sources (Wiebe, E et al., 2018). In the competitive scenario, students need to make appropriate decisions to survive in the technology world by making appropriate decisions and planning careers wisely. Career choice is a well-planned strategy that needs continuous development to manage learning skills specifically during higher secondary school. Because for making appropriate decisions it requires information regarding different career options, the eligibility criteria, students' ability, interest, and other internal and external components that play critical roles in choosing a career based on the trend (Pascual, N. T. 2014).

Career Management Process

The Career Management process is a continuous procedure that allows us to adapt to the transforming demand of a dynamic world. It embraces self-awareness, career development planning, career exploration throughout learning, and so on (Marimuthu, R et al.,). Career guidance is essential in the education system as it is aware of the diversity found in economics and career fields. Career guidance has always been a part of the higher education system since it assists students in taking appropriate decisions for their brighter future after completing school (Shen, Q., 2021). The choice of higher education stream depends on the interest, during the higher secondary education career choice is more vital and those require an appropriate career management process. As the rate of unemployment in India is always a serious concern, the Indian government takes innovative steps to intensify the quality of science students by making more effective competitive exams (Chetana, N., & Mohapatra, A. K.. 2017).

Importance of career management process during higher secondary school

- It acts as a prominent ingredient to self-assess the student based on the career planning that helps individuals to determine their strengths, positives, weakness, ability, and so on. Moreover, it also provides a pathway for a student to know themselves more sharply and determine liabilities and unlike them.
- It encourages the student to determine and leverage their strength to make a more wise decision for selecting an appropriate career that can be suitable for the future.
- They enhance the awareness regarding multi-disciplinary manner and the opportunity in front of them after completing the school in the science field based on the awareness that students can make the right decisions and follow the right direction without influencing or depending on the trend in a well-planned career goal.
- Through exploring the student's interests, and abilities, awarding them eventually intensifies the confidence among the student. With the assistance of a career plan, students can appropriately choose the right direction to set their long and short-term goals. By providing multiple career options based on the interest, skills, and priority that eventually rely on intense research for career options.

Western Odisha

The Western Odisha Development Council comprises 10 districts i.e. Bargarh, Boudh, Bolangir, Deogarh, Kalahandi, Jharsuguda, Nuapada, Sambalpur, Sundargarh, Subarnapur

and Athamallik Sub-division of Angul district (Biswal, M., 2020). There are 6193 government assistant secondary higher schools located in Western Orissa. The total number of contract teachers engaged in secondary education was 1375. The government started a flagship program in 2010 as Rashtriya Madhyamik Shiksha Abhiyan, which aimed at providing quality education in an accessible, affordable and available manner to the students who fall in the age group of 14 to 18 years with priority on egalitarian grounds for gender and justice [1].

The government also took initiative for introducing a national ambitious scheme INSPIRE (Innovation in the Science Pursuit for Inspired Research). The first phase of the scheme was initiated in the year 2010- 11 and around 695 numbers of secondary schools were selected for the scheme. Presently in the year 2021-2022, the total number of CHSE ODISHA Board students 31525. The data is integrated as it includes the first year and second-year data of higher secondary school. In these only Science, students are 17901. The data obtained from the CBSE school student 2020-2021 -10918 and for the year 2021-2022 around 12508 were admitted.

1.1 Background

The Secondary Education Commission (1952-1953) has suggested that science should be inculcated as a compulsory subject in secondary school. The science subject is based on practical learning hence the education system needs a laboratory, syllabus, teachers, books and other learning materials (Sahu, R. K., & Barik, G. D., 2019). The UNESCO Education Commission (1972) claims that "Science and technology must become essential components in any educational enterprise; they must be incorporated into all educational activities intended for children, young people and adults to help the individual to control social energies as well as natural and productive ones, thereby achieving mastery over himself, his choices and actions and finally, they must help man to acquire a scientific turn of mind so that he becomes able to promote science without being enslaved by it".

Several school counselors agreed with the notion that students encounter distinct complexity while choosing or making appropriate decisions. The National Science Foundation also exhibits critical challenges as the students obtained for higher education show their interest in courses like engineering science and technology (Myla, S. et al., 2019). Career Selection is one of the most significant activities that perform a vital role in individual life for selecting appropriate career objectives. The selection of proper academic components will lead to a promising career for students because higher education is essential to building a knowledge-based society.

2. Literature Reviews

Research related to Science stream as a career choice-

The higher education system obtains enormous attention from the research perspective on determining effective teaching quality in higher education to make the student effective to sustain their career and life as they want. The intention of the study (Marimuthu, R et al., 2018) is to determine the component based on the trend, interest of students, their capabilities, and the media opinion for choosing a career goal. The outcome of the study reveals that effective career planning is a prerequisite to follow in the initial phase of the education system to make the correct career path. The motive of the study (Wiebe, E et al., 2018) is to determine the correlation between attitude toward course subjects associated with STEM and interest in the career of US students belonging to the 4th to 12th standard. The paper surveyed 15,000 public school students and categorized the data on age, gender and ethnicity. The finding shows that the data can be bifurcated into two cluster groups: the mathematical group and the biological stream. Based on gender, males highly prefer physical

science, and female highly goes with the biological science stream. The analysis also revealed that grading did not significantly impact choosing a career related to STEM.

Another study (Li, J, et al., 2019) depends on two components to analyze the career development of high school students and the components are personal input and contextual variables. The research identifies the science technology engineering and mathematics stream from the perspective of the career decision-making procedure of Taiwan school and the student belongs to the 15 to 17 age group. The study of social cognitive career theory for exploring the data and the outcome demonstrates that counselors effectively assist in decisions by encouraging students to pursue STEM. The research (Wegemer, C. M., & Eccles, J. S., 2019) also highlights the significance of venue and other indications related to STEM career decisions which are influenced by the component like when you identify gender belief regarding the field. The study (Pascual, N. T., 2014) tries to emphasize factors that place a significant role in making a career or affect the career based on career planning procedure. Thus, the research tries to identify the component that affects the student career preferences who are studying in Morong Rizal. The analysis goes on to describe that the sheer availability of work after college is considered to influence the choice of students. Family income, occupations, student sibling position are a few of the prominent factors that impact a career making decision.

Study related to Western Odisha And Education

The paper (Biswal, M., 2020) focuses on the migration of children of Western Orissa being the most vulnerable section from an educational perspective. Western Odisha indicates several challenges like the poor education system, improper infrastructure, poor maintenance, extreme property, and severe health challenges intensify the migration in the region. Children did not obtain appropriate education and were forced to be trapped in the poverty cycle where low skills, and low wages and forced to live a mobilized life as their parents suffered. Another study (Pramanik, R., & Bag, M) tries to evaluate the educational performance of tribal students who are starting in the state government school in Western Orissa. The finding shows that education works for balancing the tribal cultural entity and endeavoring economic prosperity by formulating effective educational programs to assure the development of tribal children.

2.1 Research Gap

The problem associated with the course selection was a lack of appropriate information to choose a career for a bright future effectively. The social, economic status, and parental occupation play an influencing role in deciding their career. Students usually prefer the success formula and blindly follow it. Although, there is a significant need to identify the student's prominent factors like interest, capability, employment opportunity, and emerging sector that are effectively amalgamated for selecting specific career objectives for higher education.

Although, several studies are focusing on the Western Odisha education system like a study focusing on the Educational Performance of Tribal Students in Schools (Pramanik, R., & Bag, M), and quality education (Biswal, M., 2020). A distinct paper exploring the teaching methods and patterns (Meher, S. 2011; Sahu, R. K., & Barik, G. D., 2019). Despite that, none of the manuscripts focus on career choice and exploring career goals, specifically concentrating on the Higher secondary science student of Western Odisha. Henceforth the study identifies two research gaps-

1. Exploring the perception of Higher Secondary Science Students for their career objectives.
2. Focusing on the students of Western Odisha.

2.2 Significance of the Study

Career choice should be based on practical measures that rely on appropriate information and experience that depend on an analytical approach for choosing best for students based on their capabilities rather than following the footsteps because it is one of the most prominent ways that transform lives and should be taken seriously note without being influenced. Thus, to choose a career, there is a need to understand the student's perception. Henceforth the significance of the study is to comprehensively analyze the perception of the student and their decision to select their career and subjects for seeking higher education.

2.3 Objective of Study

- The motive of the study is to determine the perception of the higher secondary science student for making a career choice.
- To determine the components that act as a worthy ingredient in students' career choices.
- Moreover, the research also explores the career management process that performs a vital role in formulating appropriate career decisions for the higher secondary students for their bright future and sustainable growth.

2.4 Research Question

- To determine the components that play an influencing role in students' career choices?
- Identified the Career Management procedure and its role in making decisions for the career of a science student?

2.5 Hypothesis

1. Null Hypothesis

H0: Internal and External components have a positive influencing role in formulating Student's Career choice.

H1: Internal and External components did not have any influencing role in formulating Student's Career choices.

2. Alternative Hypothesis

H2: The Career Management process did not impact significantly making decisions for the career of a science student.

H3: The Career Management process plays a positive role in making decisions for the career of a science student.

3. Research Methodology

3.1 Research Design

The paper will choose a quantitative and qualitative methodology to effectively conduct the research and try evaluating the research question. Primary and secondary data need to be used for the evaluation of the hypothesis, the research question and then conclude the manuscript. To determine the Western Odisha student perspective, the paper utilizes empirical analysis methods based on primary research. Moreover, to enhance the understanding of career choice and career management strategy, the manuscript explores various existing studies which depend on the secondary methodology. Henceforth, the configuration or compiled approach that synthesis both the methodology is demanded in the research.

3.2 Research Approach

The methodology is based on a mixed approach and thus requires both primary and secondary information. Collect the information requires a critical and systematic strategy.

3.2.1 Qualitative Research Approach

- **Collection of primary data**

Primary data is acquired from real-time sources like surveys, questionnaires, investigations, and interviews and the obtained information is computed by empirical analysis. It proposes to examine the data obtained from authentic sources and alter it into statistical knowledge to verify the hypothesis and estimate the research questions.

A Structured open-ended questionnaire was employed for gathering data from several participants who were voluntarily willing to share their perceptions. The questionnaires were prepared to analyze the student perception, impact of career management procedure over career choice and others.

- **Sample Size**

The study's sample size can be determined with the help of the formula below

Calculation formula

$$n = [z^2 * p * (1 - p) / e^2] / [1 + (z^2 * p * (1 - p) / (e^2 * N))]$$

Where: $z = 1.96$

confidence level (α) of 95%

p = proportion, N = population size, e = margin of error.

- **Sampling Method**

The paper uses a Random Sampling Method based on a primary approach that relies on standard questionnaires. These questionnaires need to provide answers in the form of arrangement and disarrangement for this method.

- **Assessment Tool**

To convert the obtained raw data into its productive form, the manuscript utilizes several statistical tools for extracting and analyzing the data such as ANOVA, T-Test, Regression and correlation methods.

3.2.2 Quantitative Research Approach

The Secondary approach is based on existing resources to comprehensively explore the research topic to enhance the knowledge and illustrate all the key and prominent points effectively. For secondary data, gather particular knowledge from existing resources like online resources and offline resources (Allan, G., 2020). In this research we depend on online resources and obtain data from websites, online portals and Google Scholar for literature resources and so on. The secondary method assists in determining the research question and the hypothesis significantly. The paper selected information from the provident journals like "Emerald, Science Direct, IEEE, Frontiers, Wiley Online Library", among others.

The parameters for selecting the literature are-

- English publishers' journals are exclusively explored.
- The database is formed by collecting the literature belonging to a time span of two decades from 2016-2022.
- Inclusion criteria-literature including career choice, career interest, career management process, western odisha and education, STEM as Career choice and so on.
- Exclusion criteria - literature of different language, paper from various time duration except mentioned above.

1. Finding & Data Analysis

The data analysis comprehensively analyzes the data obtained from the sample survey as a questionnaire and encourages the participant to share their perception regarding the theme of the study. This section is classified into two segments: In the first section, the sample size

calculation and the gender description are discussed. In the second section, the assessment of the Hypothesis is explored by using the statistical tool ANOVA.

Calculation of Sample Size

The Sample size (n) =152

The calculation is accomplished based on the formula mentioned in the methodology section, the values of related terms are as follow-

$z = 1.96$,

The confidence level (α) of 95%,

$p = \text{proportion (expressed as a decimal)} = 0.5$

$N = \text{population size} = 250$

$e = \text{margin of error} = 0.05$

This demonstrates the total number of respondents in the research are 152 students willing to share their opinion who are studying in the higher secondary and living in Western Odisha.

Gender Description

The total number of participants is 152, out of this around 39% of the participants were male and about 60% of the respondents are female students.

Figure 1: Gender Description

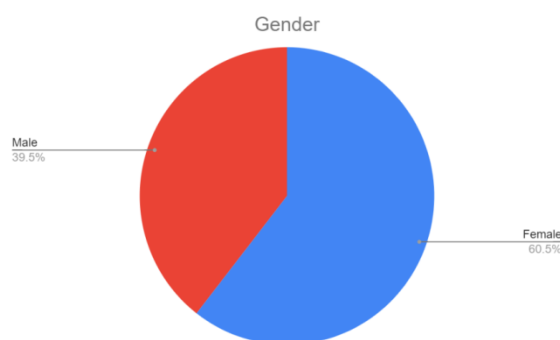


Table 1: Gender description

Gender	Frequency	Percentage
Male	60	39.5
Female	92	60.5

Assessment of Hypothesis based on research questions-

RQ1: To determine the components that play an influencing role in students' career choice?

The study of choice perception of students determines the approach in which environmental, institutional, and student characteristics play a significant role in influencing students' choice of the science students. The external influences play a critical role as it provides an abundance of suggestions from parents, guides, teachers, relatives, friends, and so on. One must focus on the understanding that this influence has long term affection because it is not only related to making decisions for choosing a subject, but it also correlates with the future regarding job opportunities, sustaining better life, and placing a significant role in every stage of life. As perception is being the complex choice to make that involves a

multidisciplinary procedure during an individual's developing aspiration to continue his Higher secondary education toward Degree education.

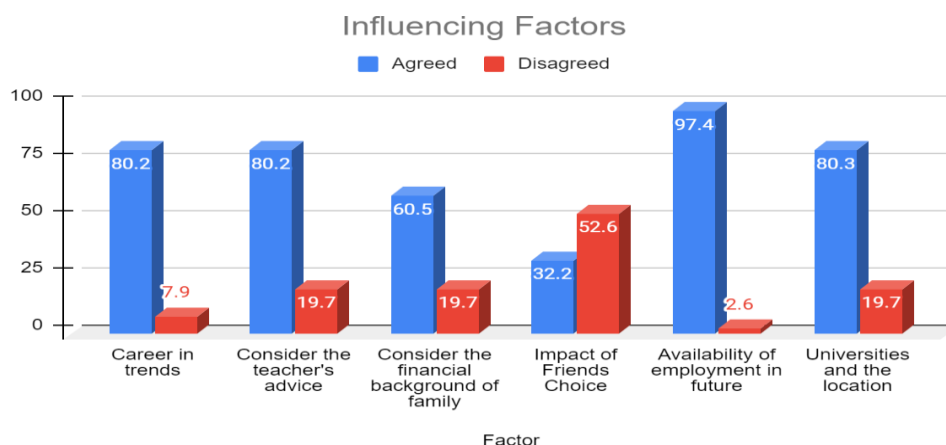
The factors that play a significant role and act as an influencer who has a capability to mold students' perception and impact on career choice decisions taken by the student -

Table 2-Influencing factors

Factor	Agreed	Disagreed
Career in trends	80.2	7.9
Consider the teacher's advice	80.2	19.7
Consider the financial background of family	60.5	19.7
Impact of Friends Choice	32.2	52.6
Availability of employment in future	97.4	2.6
Universities and the location	80.3	19.7

The prominent influencing factor explored in the research is students were influenced by the trending pattern as 80% of the students agreed that they choose the stream based on the trend, although 8% what is agreed with the contest and the remaining were in neutral condition as depicted in the (table 2). The most influencing factor among all the factors was employment perception. The students belonging to the science stream from West Odisha highly made employment their priority while choosing a career as the data shows that 97.4% of the students agreed with the context and only 2.6% of the students disagreed.

Figure 2: Influencing Factors



One of the most significant factors that have a positive influence on the student perception is their family economical background about 60.5% of the respondents agreed that they make their career choice based on their family background and about 19.7% of the students disagreed with this notion as shown in the (figure 2). When it comes to the advice that the student takes from their guide or teacher, 80% of the students believed and followed the path provided by their teacher. This makes the teacher advise and promising influencing factors that play a decisive role in informing career choice. Another component is the University and its location where the students have plans or are willing to pursue their higher studies also acts as a key influencer as 80.3% of the participants agreed that they make their career choice

based on the dream to take a particular University for their higher studies. The last component was the friend choice and the data shows that 32.2% of the students followed their friend chose to make their career decision though 52.6% of the participants agreed with the notion.

H0: Internal and External components did not have any influencing role in formulating Student's Career choices.

H1: Internal and External components have a positive influencing role in formulating Student's Career choice.

Table 3- One way ANOVA test for Null Hypothesis

Source	DF	SS	MS	F-statistic	p-value
Between Group	1	8008.33	8008.33	19.75	0.0012
Within Group	10	4054.33	4054.33		
Total	11	12062.66	1096.60		

To evaluate the relation among the variables the research utilized One Way ANOVA statistical methodology. (Table 3) demonstrates that the value of (p-value = 0.0012) is equal to the variance. The study uses Levene's test power, to evaluate the equality in variance and the data is considered to be weak (0.12).

As the value of p is less than α (0.05), this depicts that Hypothesis H1 is accepted while rejecting the H0. The smaller the value of p is more inclined to the opposite side of the null hypothesis. As the data revealed from the analysis, a vital role is played by the internal and external influencing factors in formulating students' perception of career choice because of the value of $p=0.001$. There is inequality in the average of some components in the group variables. The test statistic shows that the value of $F= 19.7$, which is not considered to be in the 95% region of acceptance, is shown in Table 3.

RQ2: Identified the Career Management procedure and its role in making decisions for the career of a science student?

The career management process is a broad spectrum that comprises several components like it plays a significant role in self-assessing the student based on their career planning and their capability likeability, interest, and skill among others. It provides an appropriate direction to choose wisely their career decisions without being influenced by internal and external factors rather than making decisions based on the information evidence with a proper career plan. (table 4) revealed that students were highly dependent on their ability, capability, skill and favorite subjects for choosing their career goals as 79.6% of the participants agreed while 6.6% of the students disagreed with the notion that students make career choices based on the preference related to their skills, capability, and favorable subjects.

Another component that is a part of the career management procedure is student interest in innovation and technology as the research is concentrated over the science higher secondary student. Hence, it is very prominent to identify whether the student has an interest in technology or not and the data reveal that 80.2% have an interest in advanced technology and innovation. As the study is concentrated on the science student who is studying in higher class the question related to their likeability for subjects related to science play a crucial role to determine their perception toward their subject and the data shows that 60% of student

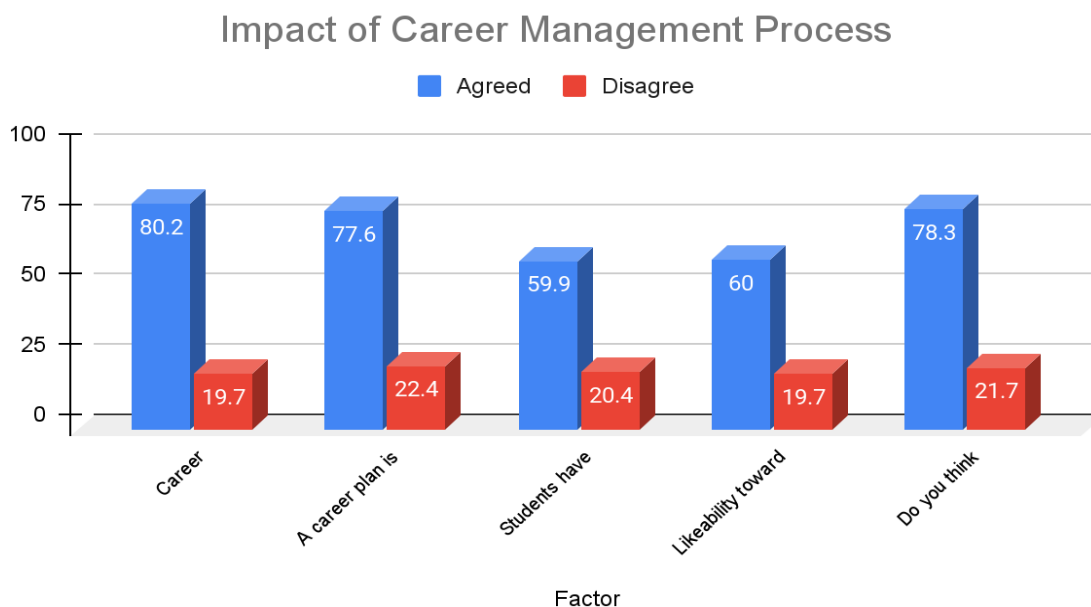
over like their science stream all though 19.7% of the student were exhibit disliking in the survey.

Table 4: Impact on Career Management Process

Factor	Agreed	Disagreed
Favorite subject, capability skills and likability	79.6	6.6
Interest in innovation, technology	80.2	19.7
Career Counselors provide effective assistance to choose a career	80.2	19.7
A career plan is worthy	77.6	22.4
Students have enough understanding regarding subjects, stream and other essential information	59.9	20.4
Likeability toward subjects related to science	60	19.7
Do you think career counselors help to prepare a career plan	78.3	21.7

One of the most significant and prominent objectives of career management procedure is awareness regarding the subject stream and all other essential information that play a crucial role performing a career choice. The analysis extracted that about 60% of the students have appropriate understanding regarding their subject stream and all other vital information prerequisites for choosing the career while 20.4% of the students did not have appropriate understanding and were unaware of their future.

Figure 4: Impact of Career Management Process.



When the question is related to career plan and career counselor the data shows that career counselor has a significant role over the student perception for making correct decisions for their future. As one of the questions related to career counselors is whether

career counselors provide effective assistance to choose an appropriate career, the data shows that 80.2% of the students agreed with the notion while 19.7% of the participants disagreed.

Another significant question was whether they think that career counselors help to prepare robust career plans to meet their future desires. The data reveal that 78.3% of the students agreed that career counselors support them to prepare effective career plans, though 21.7% show disagreement with the context. When the question is related to a career plan that student found a career plan worthy to prepare their career choice and take appropriate decisions. The analysis shows that 77.6% percent of the participants found a career plan worthy, however 22.4% of the student work disagreed and did not find a career plan to play a significant role for making appropriate career choices.

H2: The Career Management process did not impact significantly in making decisions for the career of a science student.

H3: The Career Management process plays a positive role in making decisions for the career of a science student.

Table 5- One way ANOVA test for Alternative Hypothesis

Source	DF	SS	MS	F-statistic	p-value	t-value
Between Group	1	10753.142	10753.142	187.632	0.001	13.6979
Within Group	12	687.714	57.309			
Total	13	11440.856	880.065			

To evaluate the relation among the variables the research utilized One Way ANOVA statistical methodology. (table 5) demonstrates that the value of (p-value = 0.001) is assumed to be equal to the variance. The study uses Levene's test power, to evaluate the equality in variance and the data is considered to be weakly associated (0.14).

As the value of p is lesser than α (0.05), this depicts that Hypothesis H2 is rejected. The smaller the value of p is more inclined to the opposite side as in this case, which means H3 is accepted. As the data revealed from the analysis, there is a significant role of career counselors or career management procedures to assist students to choose the right path and select appropriate careers because of the value of $p=0.001$. There is an asymmetry in the average in all group variables. The test statistic shows that the value of $F= 187.6$, which is not considered in the 95% region of acceptance, as shown in the above (Table 5).

1. Results

The research intends to analyze the student preference and their decision-making behavior, specifically higher secondary students of the science stream belonging to Western Odisha. The result prominently favors the role of career management and influencing factors that reveal a significant and promising impact on students' perception while making career choices. The components or the factor that recreate a crucial part of influencing the decision-making procedure emphasize several internal and external factors that encounter positive and negative features and can be categorized as

- 80% of the students were influenced by the trending pattern.
- 97.4% of the students choose a career for obtaining effective employment opportunities in the near future.
- 60.5% of the students make their choice based on their family economic background.

- 80% of the students believed and followed the path provided by their teacher.
- 80.3% of the participants make their career choice based on the dream to take a particular University for their higher studies.
- 32.2% of the students followed their friend choice.

Under the career management process, Counselors appropriately assist the student in making effective choices by structuring the relevant information obtained for pursuing higher education that also offers help to parents to understand their role in inspiring and motivating their children to make decisions without any pressure on their support. With the assistance of a career counselor, students try to accumulate all the relevant data and information intended or based on their mental setup and make a list of possibilities for their bright future based on their capabilities, skills, interest, and so on. All this information is very supportive to planning out and provides direction to take alternative information also and based on the relevant information a student can make his choice. The Career management process also plays a significant role in preparing a robust career plan for endeavoring opportunities for higher secondary students.

4. Conclusion & Future Scope

The significant concentration of the study is on analyzing the student's perception and their choice-making capability. Additionally, the study also explores the factors and the perceptions that influence school students, as the study was widely focused on the Western Odisha perspective. The paper discussed prominent influencing factors: the role of teacher, guide in making a career choice, the role of friends, and the trending career goals. Another factor was the economic factor comprising the family's financial background and the job security assured by the stream in the future. The last factor was the popularity of the University and its location.

Career choice should be based on practical measures that rely on appropriate information and experience that depend on an analytical approach for choosing best for students based on their capabilities, interest, and their skills rather than following the footsteps of others. Because it is one of the most vital elements that transform lives and should be taken seriously without being influenced. Thus, to choose a career, there is a prerequisite to acknowledge the student's perception. A student has adequate information regarding all the possible domains related to the science stream, he/she has self-assessed themselves before making a career choice and has an effective career plan that assures to sustain a better livelihood. All these components can be assured by adopting adequate career management processes as extracted from the data analysis.

The future scope of the study is that it can act as significant evidence for the related work as none of the research related to Western Odisha region is concentrated on the Career Choice related theme. Hence this work can be used as a source of information to enhance the understanding and knowledge related to the theme of the research.

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