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| Indira Gandhi national Open University |
| Product development process in a machine learning firm |
| Project |

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| Mathews Baby - 13121421  9/8/2019 |

**Chapter – I**

**INTRODUCTION**

**Chapter – II**

**METHODLOGY**

**Chapter – II**

**METHODLOGY**

**II.1. OBJECTIVES OF THE STUDY**

**Main Objective**

The main objective of the study is to analyze the product development process in a machine learning firm.

**Secondary Objective**

* To study the process of generating ideas for the product
* To evaluate the process development
* To suggest improvements in processes
* To assess how employees view the processes

**II. 2. SCOPE OF THE STUDY**

            There are many factors, which leads to the success of an organization. One and the most important among them is the proper management and functioning of the product development department. Hence the present study mainly focuses on the functioning of product development department giving emphasize to their functions.   We expect the study can provide proper guidelines to raise the product development process efficiency for the machine learning industry. This can help creating more products with advanced machine learning applications such as speech recognition, complex analytics and computer vision. Also the study can give an idea on the view of the processes from the perspective of employees with the help of the questionnaire.

**II.3. RESEARCH METHODOLOGY**

**Sources of Data**

Sources of data shall be both primary as well as secondary

1. Secondary sources

Secondary data are mainly collected from the reports and documents provided by the company as well as the websites described in the reference part. Also from the annual status report, effort analysis and feedback available from earlier studies from the organization.

1. Primary sources

Questionnaire: Structured questionnaire for each stage of the process. Tools like Psychologist Rensis Likert’s five level likert scale will be used in this method.

Interviews: Interaction with individuals or groups. In this method the interviewer and the respondent will keep a face to face contact.

**Sampling Method**

The population (Employee) number is less than hundred and hence the entire relevant employees have been covered. Also the study is qualitative in nature.

**II.4. LIMITATIONS OF THE STUDY**

●       The difficulty in understanding the technologies like artificial intelligence, machine learning and Internet of things which are used in the product development process.

●       Reluctance of management in sharing the micro details.

●       All internal data could not be analyzed as there are access issues related to confidentiality policies.

●       Time constrains; since the study has to be conducted in a short span of time, it may not be possible to cover all areas.

**CHAPTER III**

**DATA ANALYSIS AND INTERPRETATION**

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**DATA ANALYSIS AND INTERPRETATION**

**Table: 1**

**Designation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Designation** | **No. of Respondents** | **Percentage (%)** |
| 1 | Senior Manager | 5 | 5 |
| 2 | Technical Manager | 10 | 10 |
| 3 | Non-Technical Manager | 3 | 3 |
| 4 | Technical staff | 70 | 70 |
| 5 | Non-technical staff | 12 | 12 |

Source: Primary data

According to this table, 70% of the Employees are technical staff. Whereas 12% of them are non-technical staff. 10% of them are having the designation Technical Manager and 3% of the employees are working as non-technical manager. Only 5% of the employees are senior managers. This survey clearly states that most of the employees working in this company are from technical domain.

**Table: 2**

**Age**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Age** | **No. of Respondents** | **Percentage (%)** |
| 1 | Below 30 years | 57 | 57 |
| 2 | 30 – 39 years | 41 | 41 |
| 3 | 40 – 49 years | 2 | 2 |
| 4 | Above 49 years | 0 | 0 |

Source: Primary data

According to this table, 57% of the Employees are below 30 years of age, whereas 41% of them are in between 30 and 39 years of age. Rests of the 2% employees are between 40 and 49 years of age. It is clear that majority of the people are having age below 39 in this firm.

**Table: 3**

**Gender**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Gender** | **No. of Respondents** | **Percentage (%)** |
| 1 | Male | 51 | 51 |
| 2 | Female | 49 | 49 |

Source: Primary data

According to this table, 51% of the Employees are male and 49% are female. That shows around same percentage of male and female in the firm.

**Table: 4**

**Total industry experience**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Total industry experience** | **No. of Respondents** | **Percentage (%)** |
| 1 | Below 2 years | 26 | 26 |
| 2 | 3 – 5 years | 31 | 31 |
| 3 | 5 – 10 years | 25 | 25 |
|  | 10 – 20 years | 18 | 18 |
| 4 | Above 20 years | 0 | 0 |

Source: Primary data

According to this table, 26% of the Employees are having only below 2 years of experience while 31% of the employees are having 3 to 5 years of experience. 25% of people are having 5-10 years of industry experience and only 18% with 10 to 20 years of experience. It is clear that majority of the people are having experience less than 10 years in this company.

**Table: 5**

**Machine learning domain**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Machine learning domain** | **No. of Respondents** | **Percentage (%)** |
| 1 | Computer vision | 82 | 82 |
| 2 | Genomics | 83 | 83 |
| 3 | Chatbots | 86 | 86 |
| 4 | Natural language processing | 80 | 80 |
| 5 | Trend analysis | 0 | 0 |

Source: Primary data

**Computer vision** :

Computer vision is a field of computer science that works on enabling computers to see, identify and process images in the same way that human vision does, and then provide appropriate output. It is like imparting human intelligence and instincts to a computer.

**Genomics :**

Genomics is the study of whole genomes of organisms, and incorporates elements from genetics. Genomics uses a combination of recombinant DNA, DNA sequencing methods, and bioinformatics to sequence, assemble, and analyse the structure and function of genomes.

**Chatbot**

A chatbot is a piece of software that conducts a conversation via auditory or textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner,

**Natural language processing**

Natural language processing is a subfield of linguistics, computer science, information engineering, and artificial intelligence concerned with the interactions between computers and human languages, in particular how to program computers to process and analyze large amounts of natural language data.

**Trend analysis**

A market trend analysis is an analysis of past and current market behavior and dominant patterns of the market and consumers. An important aspect of conducting a trend analysis for an organization is to obtain insights on the market scenario, consumer preferences, and the macroeconomic environment.

According to this table, 82% of the Employee’s response is Computer vision while 83% think Genomics is also part of their work. 86% people think they are working in CHatbot related works and 80% of people bieleve they are maily working in Natural language processing. None of the people responded with the option Trend analysis. According to the survey it is clear that all four domains computer vision, enomics, Chatbots and natural language processing have equal role in thi firm.

**Table: 6**

**Kind of problems attended generally**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Kind of problems attended** | **No. of Respondents** | **Percentage (%)** |
| 1 | Existing problems | 84 | 84 |
| 2 | New problem | 16 | 16 |

Source: Primary data

According to this table, 84% of the Employees think the company deals with existing problems, whereas remaining 16% think the company generally deals with New problems. The survey clearly states that majority of the people think company mainly deals with existing problems.

**Table: 7**

**Idea generation source**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Idea generation source** | **No. of Respondents** | **Percentage (%)** |
| 1 | From employees | 3 | 3 |
| 2 | Client/Customer | 17 | 17 |
| 3 | Market study reports/external agencies | 80 | 80 |

Source: Primary data

According to this table, 80% of the Employees think the main source for idea is from market study by internal and external agency. 17% of the people think the main idea source is from clients. Only 3% of the people think idea generation from employees actually play a vital role in the company. The survey clearly shows the majority of the idea comes from either through market study or client requirement.

**Table: 8**

**Preference for the idea generation methods**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Si. No.** | **Idea generation source** | **Ranks** | | | **Points** | **Percentage** |
| **Rank 1** | **Rank 2** | **Rank 3** |
| 1 | Idea from employees | 0 | 3 | 85 | 91 | 15 |
| 2 | Client | 9 | 76 | 15 | 194 | 33 |
| 3 | Market study reports/external agencies | 91 | 21 | 0 | 315 | 52 |

Source: Primary data

Here we are ranking the preference for idea generation according to employee’s perspective. After going points to each rank we then converted it to percentage format. According to this table, 52% of the score is for market study by internal and external agency. 33% of the point is for the ideas from clients where as 15% of the score is for ideation workshop among employees.

**Table: 9**

**Employee’s participation in idea generation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Employee’s participation in idea generation** | **No. of Respondents** | **Percentage (%)** |
| 1 | Always advisable | 65 | 65 |
| 2 | Usually advisable | 25 | 25 |
| 3 | Sometimes advisable | 10 | 10 |
| 4 | Rarely advisable | 0 | 0 |
| 5 | Never advisable | 0 | 0 |

Source: Primary data

According to this table, 65% of the Employees think employees participation in idea generation always welcomes where as 25% of the mare are of the view that usually it is advisable. Rest 10% thinks it is sometimes advisable. The survey clearly shows that all of the employees welcome the concept of ideation hackathon among employees is fruitful.

**Table: 10**

**Rating the idea generation process**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Rating the idea generation process** | **No. of Respondents** | **Percentage (%)** |
| 1 | Very high quality | 68 | 68 |
| 2 | High quality | 23 | 23 |
| 3 | Neither high nor low quality | 9 | 9 |
| 4 | Low quality | 0 | 0 |
| 5 | Very low quality | 0 | 0 |

Source: Primary data

According to this table, 68% of the Employees think the idea generation process in the company is having very high quality where as 23% consider the process as high quality. Only the rest 9% consider the process as neither high nor low quality. It is clear from the survey that majority of the people consider the idea generation process in the company great.

**Table: 11**

**Team assignment for the feasibility study**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Team assignment for the feasibility study** | **No. of Respondents** | **Percentage (%)** |
| 1 | Senior level management team | 83 | 83 |
| 2 | Pre designated team for all feasibility study | 17 | 17 |
| 3 | Random selection of members from each departments | 0 | 0 |

Source: Primary data

According to this table, 83% of the Employees think senior level management team do the feasibility study whereas the rest 17% of the people think there is a pre designated team for all feasibility study. None of them think that the random selection of team members happens in the firm.

**Table: 12**

**Preference for assigning teams for feasibility study**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Si. No.** | **Preference for assigning teams for feasibility study** | **Ranks** | | | **Points** | **Percentage** |
| **Rank 1** | **Rank 2** | **Rank 3** |
| 1 | Random selection of members from each departments | 0 | 0 | 100 | 100 | 16.7 |
| 2 | Pre designated team for all feasibility study | 21 | 79 | 0 | 221 | 36.8 |
| 3 | Senior level management team | 79 | 21 | 0 | 279 | 46.5 |

Source: Primary data

Here we are ranking the preference for the assignment of teams for feasibility study according to employee’s perspective. After giving points to each rank we then converted it to percentage format. According to this table, 46.5% of the score is for assigning senior level management for the feasibility study where as 36.8% of employees consider a pre designated team for all feasibility will be more useful. 16.7% of the point is for random selection of members from different departments.

**Table: 13**

**Leadership of team for studying the feasibility of selected ideas**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Team assignment for the feasibility study** | **No. of Respondents** | **Percentage (%)** |
| 1 | Member from marketing | 2 | 2 |
| 2 | Member from technical | 98 | 98 |
| 3 | Member from finance | 0 | 0 |
| 4 | Member from HR | 0 | 0 |

Source: Primary data

According to this table, 98% of the Employees think technical department leads the team for feasibility study where as 2% people think it is marketing team. Eventhough we had options such as finance and HR, only 0% of the people voted for them. It is clear from the survey that approximately Zen percentage people believe it is from technical department.

**Table: 14**

**Idea selection process in the company**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Idea selection process** | **No. of Respondents** | **Percentage (%)** |
| 1 | By voting majority | 9 | 9 |
| 2 | Consensus after discussion | 91 | 91 |
| 3 | Analytical | 0 | 0 |

Source: Primary data

From the above table we can see that an idea will be selected in the company mainly using consensus after discussion. We are considering majority voting and on an analytical method also. We can understood from the above table that 91% employees says that the idea selection process is always through consensus discussion and only 9 % says that’s through the majority voting but no one is in the phase of Analytical selection.

**Table: 15**

**Preference for Idea Selection Process**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Si. No.** | **Preference for Idea Selection Process** | **Ranks** | | | **Points** | **Percentage** |
| **Rank 1** | **Rank 2** | **Rank 3** |
| 1 | By voting majority | 8 | 67 | 25 | 183 | 31 |
| 2 | Consensus after discussion | 81 | 15 | 4 | 277 | 47 |
| 3 | Analytical | 8 | 17 | 75 | 133 | 22 |

Here we are ranking the preference for the idea selection process according to employee’s perspective. After giving points to each rank we then converted it to percentage format. According to this table, 47% of the score says that Consensus after discussion is used for the idea selection process is where as 31% of employees consider majority voting will be good. Only 22% opt for the Analytical Process.

**Table: 16**

**Estimate the approximate time and cost for a product**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Estimate the approximate time and cost for a product** | **No. of Respondents** | **Percentage (%)** |
| 1 | Experience from similar projects  carried out by us | 79 | 79 |
| 2 | Competitors cost/quote | 5 | 5 |
| 3 | Own estimate | 16 | 16 |

Source: Primary data

From the details above we can understood that about 71% of employees says that the experience from similar projects carried out by the company itself will help them to find the approximate time and cost estimate for a product and the only 16 % of says that it is by their own estimate ,only a little which means 5 % says that it according to Competitors cost.

**Table: 17**

**Methods for the detailed study on the selected ideas**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Methods for the detailed study on the selected ideas** | **No. of Respondents** | **Percentage (%)** |
| 1 | Assigning different teams with different objectives | 85 | 85 |
| 2 | Studying reports of similar products within the company | 15 | 15 |
| 3 | Competitors reports | 0 | 0 |

Source: Primary data

From the above table it is clear that the company did not prefer the competitors reports for studying the selected ideas, instead they are assigning different teams with different objectives so that it shows a percentage of 85 from the employees. 15% employees consider Studying reports of similar products within the company itself useful for studying the selected ideas.

**Table: 18**

**Preference for the process of detailed study of selected idea**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Si. No.** | **Preference for the process of detailed study of selected idea** | **Ranks** | | | **Points** | **Percentage** |
| **Rank 1** | **Rank 2** | **Rank 3** |
| 1 | Assigning different teams with different objectives | 85 | 12 | 3 | 282 | 47 |
| 2 | Studying reports of similar products within the company | 13 | 79 | 8 | 205 | 35 |
| 3 | Competitors reports | 0 | 10 | 90 | 110 | 18 |

Here we are ranking the preference for the process of detailed study according to employee’s perspective. After giving points to each rank we then converted it to percentage format. According to this table, 47% of the score says that the assigning different team with different objective will result in a good result where as 35% of employees consider Studying reports of similar products within the company will be good. Only 22% opt for the Competitors reports.

**Table: 19**

**Team leader for studying the details of selected ideas**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Team leader for studying the details of selected ideas** | **No. of Respondents** | **Percentage (%)** |
| 1 | Member from marketing | 2 | 2 |
| 2 | Member from technical | 98 | 98 |
| 3 | Member from finance | 0 | 0 |
| 4 | Member from HR | 0 | 0 |

Source: Primary data

From the above table we understood that employees always consider a member from the technical team as the leader for studying the details of selected ideas so that 98% select for that. Only 2 % people consider a member from the technical team will be helpful. No one will be satisfied with a member from a finance and HR department.

**Table: 20**

**Preference for the important fields covered in the detailed study of a product**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Si. No.** | **Important fields covered in the detailed study of a product** |  | **Ranks** | | | **Points** | **Percentage** |
| **Rank 1** | **Rank 2** | **Rank 3** | **Rank 4** |
| 1 | Marketing | 20 | 67 | 13 | 0 | 307 | 31 |
| 2 | Technical | 81 | 15 | 4 | 0 | 377 | 38 |
| 3 | Finance | 2 | 16 | 78 | 4 | 216 | 21 |
| 4 | HR | 0 | 0 | 5 | 95 | 105 | 10 |

Source: Primary data

Here we are ranking the preference for the important fields covered in the detailed study of a product according to employee’s perspective. After giving points to each rank we then converted it to percentage format. According to this table, 38% of the score says that they are giving important for the Technical one and next with somewhat equal preference they are considering marketing, that is 31 % . Finance and HR department are having 21 % and 10 % respectively.

**Table: 21**

**Rate the process for the detailed study of an idea in the company**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | Team leader for studying the details of selected ideas | **No. of Respondents** | **Percentage (%)** |
| 1 | Very high quality | 2 | 2 |
| 2 | High quality | 23 | 24 |
| 3 | Neither high nor low quality | 73 | 74 |
| 4 | Member from HR  Low quality | 2 | 2 |
| 5 | Very low quality | 0 | 0 |

Source: Primary data

**Table: 22**

**Teams assigned for product development in the company**

|  |  |  |  |
| --- | --- | --- | --- |
| **Si. No.** | **Teams assigned for product development in the company** | **No. of Respondents** | **Percentage (%)** |
| 1 | New team with sufficient expertise in each functionality | 87 | 87 |
| 2 | Reassigning work to a team had  similar project | 9 | 9 |
| 3 | Inviting application from employees | 4 | 4 |

Source: Primary data

From the above table we can conclude that the team assigned for product development is by the new team with sufficient expertise in each functionality so that 87 % of employees opted this and 9% employees prefer to Reassigning the work to a team had similar project,only 4 % thinks Inviting application from employees will be helpful