A way to the practical orientation of the conceptual framework & methodology to derive customer intelligence

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Abstract:
A theoretical structure focuses on the core areas to be examined, the components, and the apparent interrelationship among each other. Based on the described theories on the previous journal paper (Derivation of Customer Intelligence from Customer Knowledge Management)[18],the conception that is apparent as the most important for the research will be preferred. Every concept has been prepared on the ground of their prospective strengths on the topics of data gathering in CI (Customer Intelligence). The objective is to present a concise preface to the research methodology. The selected research methodology and ways of obtaining the research goal are discussed. It also includes the reliability and validity check methodology to obtain Customer Intelligence (CI).

I. CONCEPTUAL FRAMEWORK

A. Customer Data Acquisition

The important concern is what should be the objective of the research in order to have a realistic approach to the Customer Intelligence (CI). On the basis of the goal to achieve the concept of the CI, a set of research questions need to be formed (in regards to the data and information availability in different sources of data). The research questions will concentrate on how CRM obtains the significant customer data (from different data sources) to produce CI. Bearing on the data acquisition process, CKM theory supports the communication with the client. This implies that the information required to generate customer knowledge should also be gathered through interviews and communication with the client. However, this inference does not eliminate data gathering procedure where there is passive communication with the clients. In many organizations, the communications are more in a passive way with customers (from the CI point of view). The business figures and available data, information on different data platforms can help to generate the Customer Knowledge (CK) which lead to Customer Intelligence (CI).

After considering the above, the data acquisition methods examined in the closed business environment of an organizations on the basis of theories given on the previous journal paper [18] (Derivation of Customer Intelligence from Customer Knowledge Management). More precisely, to figure out the data gathering tactics, the following parameters to be verified will provide the methods through which the CRMs in an organization can obtain the correct information in the closed business atmosphere, as well as, with the scope of interaction with the client during that procedure.

Customer Data acquisition methods:

- Web based survey /Interviews ([2] [3] [4])
- Online community ([2] [3] [4])
- Transactions ([2] [3] [5])

A. Generation of Customer knowledge

The research question also aims to recognize how CRMs works on the gathered customer data to produce customer knowledge. CKM is explaining the implication of a successful client data processing for the well implementation of the conception. In addition, the knowledge, customs of the companies has a vital role in the successful implementation of data operations. Thus, the KM procedure should be implemented to answer all the research queries.

Grounded along with the previous literature [18], the evaluation of information processing and knowledge management steps will provide with insights on which procedure does the companies follow and the level of their knowledge culture [7].

Customer Data Processing:

- Knowledge classification and production through customer database [8]
- Knowledge storage space and codification [8]
- Knowledge sharing [8]
- Knowledge consumption and feedback [8]

B. Deployment Knowledge

According to the previous theories [18] (Derivation of Customer Intelligence from Customer Knowledge Management), the employ of CK should guide to the co-creation of the goods with the clients and that the output of such association should be valuable for both sections. The state of art also describes five precise conducts through which organization deploys CK. The following theories are taken into consideration on customer knowledge deployment.

Customer knowledge Deployment:

- Client portfolio [1]
- Building sections [1]
- New manufactured good development ([1] [5])
- Improving business procedure and client service [1]
- Marketing communication and promotions ([1] [7])

C. Reference Structure

Based on the journal [18] (Derivation of Customer Intelligence from Customer Knowledge Management), a reference structure has outlined. This reference structure (Figure 15) [8] will present a directive for the data operations. It also, explains the data collection methods and presents a reference structure to attain the principle of the work.

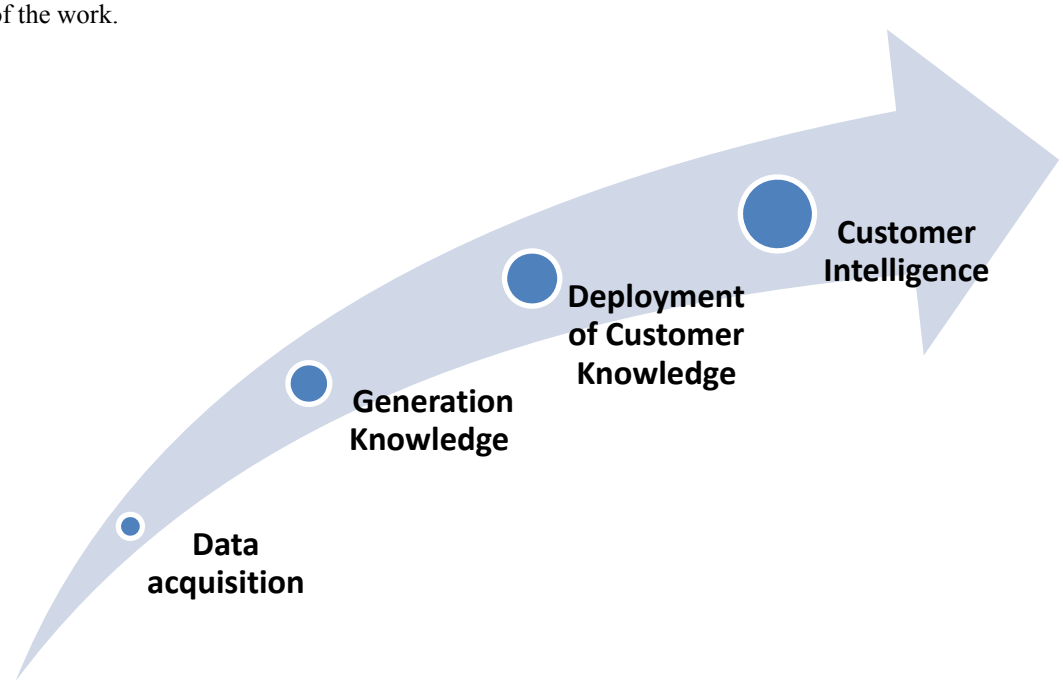

Figure 1 : Complete structure of reference (CI)

The above figure 1[6] shows that CI is a continuous procedure which includes several steps. The data acquisition procedure is the primary action, where the client data are gathered from a variety of databases. The operations are conducted on the collected data in order to change them into valuable knowledge for the companies. In the end, this knowledge is being analyzed in numerous conducts to prepare the concept of Customer Intelligence for the companies [9]. The sequence of steps in the reference structure is repeated (figure 15) [6], to reach the practice of Customer Intelligence. These processes constantly improve and modernize the quantity and quality of the companies' CI and to make the most from the CI [7].

II. METHODOLOGY

A. Research Process

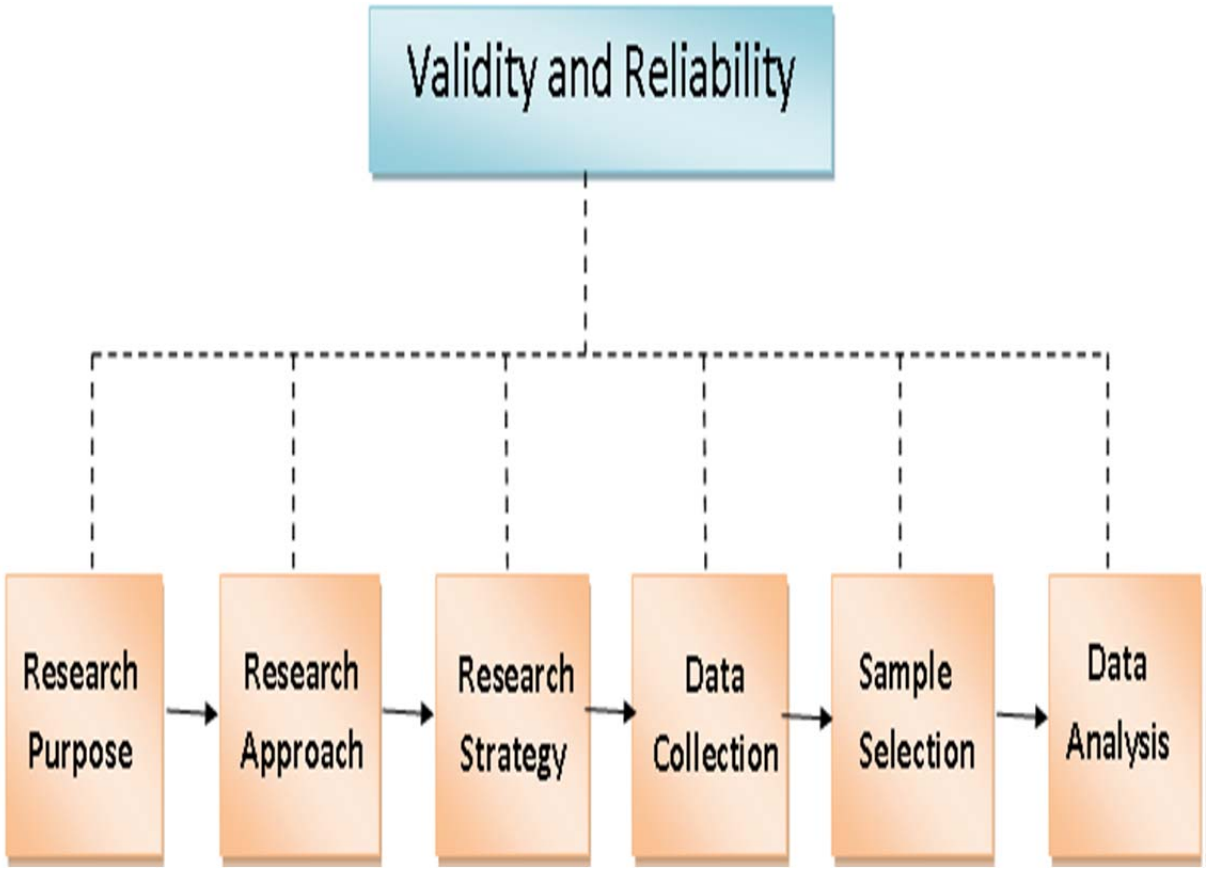

Figure 2: Methodology of research

The research study can be explained as any structured investigation analyzes present information for problems solving. The industry research is a methodical investigation whose purpose is to solve professional issues or managing confusions: the dilemmas or opportunity that requires an executive decision [10]. In general, the research procedure needs a series of steps which are being described in the Figure 2.

1) Research Purpose

The objective of the study may be classified into three sections based on what the investigator wants to attain: search a new theme, explain a social occurrence, or describe why something occurs. The studies may have multiple objective, but one is generally main (See table 1) [11].

Exploratory	Descriptive	Explanatory
-Get to know the fundamental information -Produce a common portrait of the situation. -Bring forth new ideas, hypotheses, or theories. -Find out the likelihood of present inquiry. - Develop methods for evaluating and finding future data.	-Furnish a comprehensive, characterization. -Find new information that challenge past information -Make separate types. -Elucidate a series of phases. -Document a contributory procedure. -Report about the site.	-Examine the theories -Detailed theory's description. -Draw out novel issues. -Defend explanation. -Relate topics with a universal theory. -Conclude the best explanations.

Table1: Research Objective Section

This study tries to investigate the prospective of the customer intelligence in a closed and open business environment of a firm [9]. Since the reason of our research is to find a perceptive of relatively new topic customer intelligence in a way to get closer to it, it qualifies for exploratory. Then our research questions are formulated to follow research in exploratory ways [9].

2) Research Approach

The approach that has been selected for the study is qualitative. In this approach, the investigation takes in the knowledge based principally on constructivist perspectives (i.e., the multiple significances of the personal experiences, with an aim of developing some theories) or support specific scenarios (i.e. Political, problem-oriented, combined, or transform oriented) or both [12].

There are two traditions to research such as deductive or inductive. Deductive research begins with previous concepts & theories and structure literature that are consequently tried out; its plus point is to know old theory [13]. The researcher starts with an abstract, rational association along with concepts and then shift toward solid pragmatic proof [11]. An inductive research begins with real-world information, and categories, concepts and designs, theories come out from this input [9]. The researcher begins with comprehensive observations of the data and advance toward more theoretical generalizations and identifies initial relations [11].

As the objective and questions of research were formulated on real world information and concepts, the respective study is inductive. That means the research outputs cannot be generalized.

3) Research Strategy

A research strategy is the standard procedure to perform the research [13]. There are five types of research strategies. These strategies are to apply when gathering and analyzing pragmatic evidence: experiments, surveys, past analysis and case histories [14]. The three conditions which are relevant in choosing the best research strategy:

- The kind of research questions called for.
- The extent of control a researcher has over real behavioural events.
- The level of focus on current, as opposite to chronological, events.

The foremost and most essential state is selecting the research strategy among the different research strategies. And the preeminent means to realize is examine the research question being called for. ''How'' and ''why'' research questions are liable to contribute to the use of stories and experiments as the ideal research strategies. Considering the above into a statement, experimenting and history is possible, research strategies in current studies [15]. The experimental strategy can be used to compact with the similar facts as the history, only adds the option of consulting, straight observations and perform experiments. As it is discussed above, both methods are selected strategies when questions ''why'' and ''how'' are being asked, but similarly when the researcher has diminutive control over results, and when the focus on real-life circumstance in the current phenomenon [15].

An experimental investigation examines a modern concept within its real-life situation, particularly when the margins between concept and context are not clearly visible. As well, it enables a study to keep the holistic and evocative features of real-life events [15]. The qualitative approach finds to be the most suitable for this study.

4) Data Collection

The most pragmatic evidence is data. It should be gathered vigilantly according to the data operations. More than one technique is used by data scientist to gather data. The qualitative information is collected in the present research, which in fact means collecting information in the form of numbers and strings. Different techniques are used based on their performance on specific queries and issues. It needs skill, drill, and vision to go with a suitable technique of data collection [11]. The sources of data are SAP tools, interviews and archival records. In this research, the data sources which are considered important are interviews and SAP systems (reporting tool like CRM, industries database, Intellectual property database and Business Portfolio) and will be processed. The SWOT analysis of data sources can be found in Table 3

Source of Evidence	Strengths	Weaknesses
Documents from SAP tools	• Stable – Revision possible • Accurate – exact details, • Extensive coverage – backgrounds • Retrievability – Low (may be)	• Selectivity Biased, • Biased Reporting unknown author • Access on purpose denied
Interviews	• Aim – focus on the subject • Perceptive – provide inference	• Poorly formulated questions • Answer influenced • Inaccuracy (poor recollection) • Reflexivity – interviewer biased

Table 1: SWOT analysis

Documents are significant in the data gathering process in a research study. Researcher should be careful about the interpretation of files, since they are not prepared for research study [15]. Alternatively, the interview as a mutual discussion is a chance for an interviewer to participate enthusiastically in the mutual discussion and states the importance of the interview as data sources of research. The interview is prepared on the base of predetermined questions. There interviews types are three types: focused, structured and open-ended. In open-ended, the interviewer takes the unstructured questions from respondent, therefore granting the mutual discussion to be more as a friendly communication. The focused interview planned to confirm the details that known by the interviewer. The third kind of interview is a mixture of a survey and an interview.

Most interviews which take place on a face-to-face basis are qualitative. However, one-to-one discussion may be telephonic in specific situations. In the role of the respective research, the interviews have been conducted and the data has been selected from the different department reports of organization and official web pages [16]. For the respective research, the open-ended and face to face interviews were held. Every interview is jotted down very clearly to burn down the hazard of loosing details and for the facility of revision.

5) Sample Selection

The sampling techniques present a scope of tactics that assist you to cut down the quantity of information you require to gather by allowing only data from a subgroup [16]. The non-probability or non-random samples were often used by qualitative scientist. This intends that they seldom see the sample volume before hand and they knew partially about the complete data set of the selected sample [11]. Non-probability and judgment sampling most frequently practices in the research work. Judgmental sampling enables you to opt for scenarios that will enable you to solve your research queries and to fulfil your primary goal.
In the respective research, the non-probability and judgmental sampling techniques are used to gather the important information. In organization, there are multiple different data sources (related to business figures) are studied to investigate about the customer and to test the prospective of the customer intelligence [9]. Therefore, the study has been performed in the present section as the most suitable for our research.

6) Data Analysis

Researchers begin collecting information and developing channels to evaluate based on their findings. As they collect data, they speculate on the process and grow fresh estimates. The estimates direct them to the new ways for evaluation. In return, new directions to determine how the researcher will go to prolong the data collection process. They link estimates and data through end to end of the continuous interactive process [11]. The qualitative study on data includes three actions: data reduction, data demonstration, and conclusion sketching [17].

Data reduction implies to the procedure of selecting, abstracting, simplifying, and converting the data. Qualitative data can be cut and altered in numerous ways (select, paraphrase, subsumed) [17].

Data demonstration is an ordered and compressed collection of data that help in conclusion sketching. Viewing at data demonstration enables to view the working and that will enable to do the action-based on reason. The qualitative analysis can be validated by good demonstration. Conclusions may emerge after completion of the first two steps of data collection.

The above discussed sequence (reduction, data demonstration, and conclusion sketching) was adopted for data analysis [17]. First of all, the data are reduced according to the parameters to be validated. Specifically, the relevant information is simplified and focused to supply the appropriate solutions. Thereafter, the selection of data was compared with the applicable theories discussed in our reference structure.

B. Reliability and Validity

Reliability defines constancy or consistency. Researchers apply different kinds of methods (e.g. Document studies, interviews, etc.) to record their explanation consistently. Their main goal is to be consistent with respect to the time and observations to get the notion of constancy [11].
Conversely, validity suggests productivity or the means to develop the idea in a theoretical definition. The dependability is essential for validity and it is easier to attain than validity [11].

Though reliability is all important in society to receive convincing criteria of a , it does not guarantee about the validity of the criteria. It is not a satisfactory clause for validity. A process can deliver the same results again and again (reliability), but what it gives may not go with the expectations of the concept. The bull's-eye illustrated the reliability and validity relationship (Figure 3) [10].

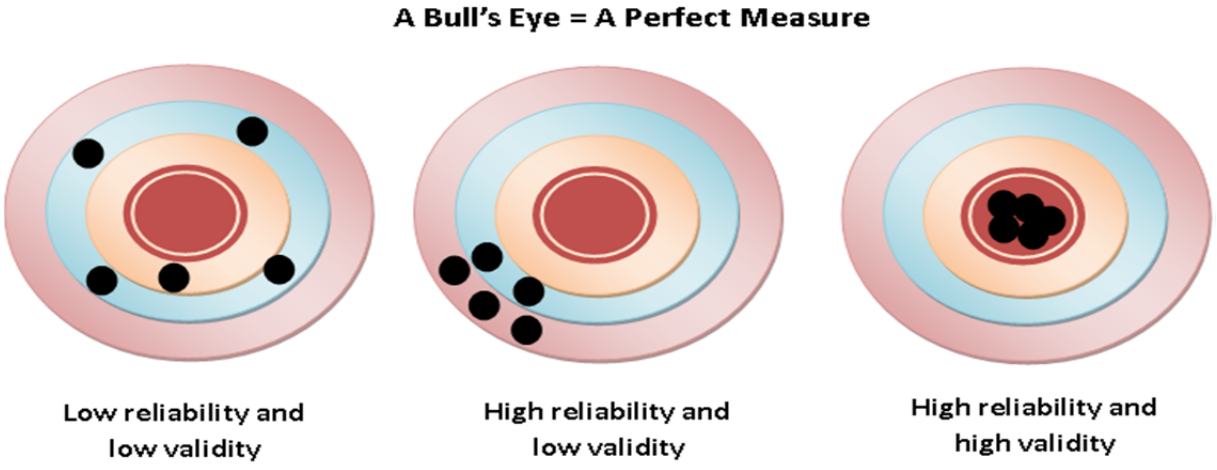

Figure 3: Illustrates the validity and reliability relationship

There are four ways to judge the research intent (Figure 3) [10] [7]:

1) Build validity: Establishing correct functioning criteria for the concepts.
2) Inner validity: Developing the fundamental relationship (flexible conditions).
3) Outer validity: Developing a research oriented area where the respective findings can be generalized.
4) Reliability: displaying the same operations producing the same results.

To ensure validity and reliability of the respective research, the following measure was taken. Every interview output has been read and marked by a supervisor. The hosts were from the firms, Interviews procedure was created based on the reference structure to make sure the validity of the present research.

The resultant output will be validated by following the below given metric. The validation metric provides the validation results of the approaches used in the practical operation of the present research on CI. The validation metric has been following the four phase process (Table 4). The following sub processes of validation are:

- Validation of question
- Validation of sources
- Validation of Tools
- Validation of output

In the validation matrices, different combinations have been trying to find the best outfit solution. The validation is done on in four phases. The validation will cross check each and every step of process by testing 'OR' and 'AND' conditions.

Complete Validation matric					
Validation of the question					
Question 1	OR/AND	Question 2	OR/ AND		Question N
Validation of the sources					
Source1	OR/AND	Source2	OR/AND		Source3
validation of the tool					
Tool 1	OR/AND		OR/AND		
Output results					
Regression analysis	AND	Keywords		AND	Business figures
Validation of output					
Good results, Not accepted					
1) Good results, accepted by stake holders 2) Good results, not accepted by stakeholders 3) NOT OK_Not Significant					

Table 2: Validation Matrix for Research questions

- **Validation of question**
  The validation of the question has to be checked. The different combination of the question has been tried to test the validity of the questions in context to the objective of the research and the data sources.
- **Validation of sources**
  The validation of the sources has to be checked. The different combination of the sources has been tried to test the validity of the questions in context to the objective of the research and the research areas.
- **Validation of Tools**
  The validation of the tools is one of the most significant things for any process. The different combination of the tools has been tried to get the best output in context to the objective of the research and the data available.
- **Validation of output**
  The output validation is the most significant period of the whole research. The significance of outputs has been held with respect to the stakeholders. And the outputs obtained through different research question can be used in combination to get the best outcomes in context to the requirement of the present research.

The standard results from validation metric divided into categories. These categories are:

- Good results, accepted by stakeholders

- Good results, not accepted by stakeholders
- Insignificant results - NOT OK

These standard results are examined on the basis of the requirement of the stakeholders. The good results accepted by stakeholders will support CRMs for the strategic decisions. The good results which are not accepted by stakeholders could be used for future propose.

III. CASE STUDY

The theoretical example given below is of a hypothetical firm X which wants to derive customer intelligence. The firm has multiple departments such as:

1) Accounts Department: That deals with the financial data of internal and external customers. The database belongs to this department named as A1.
2) Research Department: That deal with the intellectual properties of the firm. The database belongs to this department named as R1.
3) Academic Relation Department: That deals with the financial and project details with the universities of firm X. The database belongs to this department named as A2.
4) Marketing Department: That deal with the team who is responsible for advertising in or out of social media. The database belongs to this department named as M1.
5) Business Intelligence Department: That deals with the business data of internal and external customers. It also keeps an eye on the competitors of the firm X. The data base belongs to this department named as B1.
6) Business Mandate Department: That deals with the Mandate and portfolio of the firm. This department describes the duties and limits to technological departments. The database belongs to this department named as B2.
7) Customer Care Department: That deal with the customer regarding the problems associated with products and project of the firm. The database belongs to this department named as C1.
8) Sells department: That deal with the financial data of selling product to the external customers. The database belongs to this department named as S1.
9) Technological departments: That deal with the technologies. These departments are the real worker for the firm X. Each department produces the product or complete the project as per technologies specified to it for the internal and external customers. The data base belongs to this departments named as T1, T2, T3 and so on for each department. For example Cloud computing database T1 deals with all the projects related to cloud computing.

   A1: contain the information related to the money spend by the firm X such as financial source, project name, location, project team, Department name, Project description. The financial source categorize into three sections named as F1, F2 and F3.
   F1: money spend by the firm on the product
   F2: money spend by the customer on the product
   F3: money spend the govt. on the product

   So database table might be like a table given below.

Project Name	Customer name	Firm's department	Project leader	Name of Money source	F1	F1	F3	Project Definition	Etc.

Table 5: Database Table

Similarly there would be several databases of various departments in firm X.
Using the business logic, the most appropriate demand to achieve customer intelligence is to predict about the customer's future step. The research methodology to derive customer intelligence has been explained step by step in the following table.

Research Methodology	Objective	Approach	Results
Research Process	Exploratory	To develop methods for evaluating and finding future data.	Prediction about the inclination towards research of firm X related to specific technology
Research Approach	Qualitative –Inductive	As the objective and questions of research were formulated on real world information and concepts, the respective study is inductive. That means the research outputs cannot be generalized. A research question has been setup.	**What are the innovation areas of department Y of Firm X supported by Govt. (F3)?**
Research Strategy	Qualitative-experimental	An experimental investigation examines a modern concept within its real-life situation, particularly when the margins between concept and context are not clearly visible. As well, it enables a study to keep the holistic and evocative features of real-life events. These strategies are to apply while gathering and analyzing pragmatic details based on research question.	**Gathering Pragmatic details** -data for financial background to see what are the projects funded by Govt. from database A1. -Data for research technologies can be taken from R1 department to know the inclination of the research project towards technologies - Data is taken to understand which technologies are being supported by which technological field. For an example of a pragmatic details (S represent as a source), S1 is an independent data source for S2 and S3. S2 is Dependent on S1 but independent from S3. S3 is Dependent on the output of S1 operation, but independent from S1.
Data Collection	Extract data from SAP tools, interviews and archival records	SWOT analysis to choose right data source	Right data sources are selected after having a SWOT analysis on pragmatic details (research strategy). **Selected data sources are A1, B2,**

			R1
Sample Selection	Automated Manual	Sample selection for selecting required parameters	Monthly and yearly report of A1 Monthly and yearly report of B2 Monthly and yearly report of R1 **Type of data sample is** -Numeric data - text data
Data analysis	Data reduction, Data demonstration, Conclusion sketching	Developing channels to evaluate on the basis of researchers finding. They speculate on the process and grow fresh estimates.	**Data Reduction Results:** For text data: Important Keywords after removing unnecessary data **For numeric results:** Numeric data comparison between the same parameters of different departments **Data Demonstration:** Pie chat, histogram , Keywords, Regression analysis, Numeric data **Conclusion :** The results are significant or not depend upon the expectation and data of the firm X
Validation & Reliability	Validation: Validation of Question Validation of Source Validation of Tools Validation of Output Reliability: same operations same results	With every step of research methodology, validation has been checked	***Validation:*** **Validation of Question**: Three questions have been combined together to form a validated question (What are the innovation areas of department Y of Firm X supported by Govt. (F3)?). **Validation of Data sources:** Selected

			data sources are A1, B2 and R1 out many data source**.** **Validation of Tools:** Different tools have been tested on data set. Python NlTK, Weka are considered most prominent one. **Validation of Output**: All outputs such as Numeric data, Business figures and text data have been checked for the analysis. The combined analysis result to a standard outcome.
Final results	Good results-Accepted by stakeholders Good results-Not accepted by stakeholders Insignificant results - NOT OK	These standard results are examined on the basis of the requirement of the stakeholders.	Theoretical results are significant for the above questions and accepted by firm X.

Table 6: Table showing research methodology to derive customer intelligence

RQ: What are the Innovation areas of technological department Y supported by Govt. (F3)?

For the prototype (P): Required data sources are Business Mandate (B2), Research (R1), Account (A1) and Keywords (K).

K: represents a multi dimensional array with keywords lists such K1, K2 and so.
For an example, K= {K1, K2, So on}
L: represent a list
C: represent clustering keywords
B2 [18] is an independent data source for R1 [19] and A1 [20]. R1 is Dependent on B2 but independent from A1. A1 is dependent on the output of B2 operation, but independent from R1.

1) Collect the K1: Keywords from the combination of Portfolio elements and description of a particular department using the concept of text summarization using data base B2. Text summarization is the concept of bags of words.
2) Do the advance search in research department (R1). The advance search query K2 is a combination of {K1, department name, and technological units}.
3) After Advance search, a list of registered Patent will be generated named as L1.
4) From L1, Collect the new keyword list K3 by using the text summarization on (Title, description, Advantage) of each patent of L1 using the concept of text summarization.
5) Collect key word list K4, using the concept of text summarization of filtered A1 report of specific department with project type (Research) from database (B2). So K 4 is an output from the text summarization of (Title. Focus area) of each project) of B2 Database.
6) Then use the concept of Clustering C1: {K 4, K 3} to figure out the innovation areas.
7) Now search project based on C1 from A1 for technological department Y. And the output is from C1 and A1 search.

The whole process is not only traversing vertically, but also moving horizontally. The figure given below is representing the Graphical process landscape of Prototype (P).

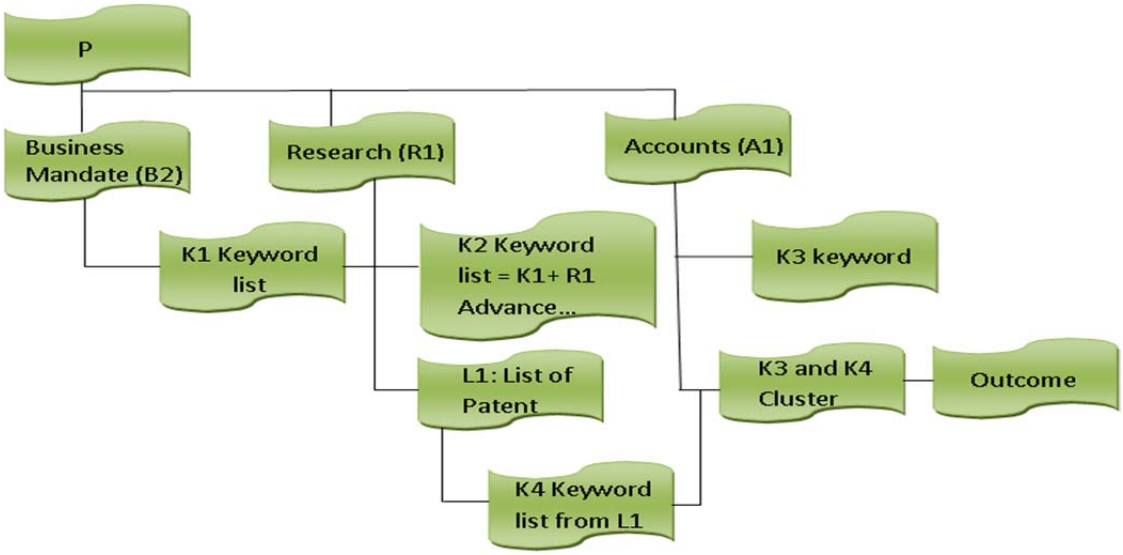

Figure 4: Graphical process landscape of Prototype (P)

- ➔ Text summarization: Removal of all conjunctions, preposition, supporting verb, infinitive verb and articles.
- ➔ Clustering: Test on manual clustering techniques.
- ➔ Analysis of the cluster for the stakes holder

RQ: What are the innovation areas of department Y of firm X supported by Govt.?	**Answer**	**Reasons**
Not Significant results	**If accuracy rate is Low**	• The results from Advance search in R1 are not department based. • In A1, the research project is not completely considering as an innovation. • It is very difficult to judge the authentic innovation projects from A1 Keywords.
Significant results accepted or not accepted by Stakeholders	**If accuracy rate is high**	• The results from Advance search in R1 are department based. • In A1, All the research projects are innovative.

Table 7: Analysis of Research Question

IV. CONCLUSION

The objective of this journal paper is to present a brief approach of the conceptual framework & research methodology to derive the Customer Intelligence. The ways to obtain the research goal are discussed in the journal. It also includes the reliability and validity methods involved in the derivation of the Customer Intelligence. This journal also structures the focuses on the core areas to be examined, the components, and the apparent interrelationship among each other. Based on the describe theories on the previous journal (Derivation of Customer Intelligence from Customer Knowledge Management), the conception that are apparent as the most important for the research will be preferred. Every concept has been prepared on the ground of their prospective strengths on the topics of data gathering in CI. These methods set a layout to obtain the concept of CI to the Industry.

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