CHAPTER 3

RESEARCH METHODOLOGY
3.1 Research Objectives

The objective of the research (given below) tries to address the challenges faced by organizations delivering SAP services:

1. To identify, enlist and classify competencies of practicing SAP functional consultants.
2. To map competencies of practicing SAP functional consultants in India.
3. To develop a competency model for SAP functional consultants in the following SAP functional modules:
   i. Sales and Distribution
   ii. Materials Management
   iii. Production Planning
   iv. Finance and Controlling
4. To enumerate factors of importance for development of competencies amongst the SAP functional consultants in India.
5. To validate the developed competency model by training SAP functional consultants.
6. To suggest levels of competency and way of integrating competency model to information technology companies.

3.2 Type of Research

The type of study is exploratory cum action research. The study has attempted to explore competency factors that are required for a SAP functional consultant. Researcher solicited information from subject matter experts in SAP module, global industry leaders in SAP space and the researcher solicited information from SAP functional consultants across the country (India) to validate the competency model thus developed. The study is exploratory in nature as the researcher has tried to draw inferences and arrive at valid conclusions based on scientific
analysis of the collected data. Action research methodology has been adopted to test the competency factors that were identified while training SAP functional consultants and post training performance was assessed qualitatively.

3.3 Research Model

There are two types of methodologies generally followed for arriving at a competency model:

- Starting with a validated model
- Starting from the scratch

Researcher plans to use “Starting from Scratch” methodology for arriving at a competency model. This methodology has the following steps (listed below):

- Identification of Competency Factors and Related Experience Indicators for ERP Functional consultants in India
- Identification of building blocks for SAP Functional modules which influences competency of a SAP Functional Consultant
- Identify Attributes in Building Blocks by SAP Module
- Validate Attributes in Building Blocks by SAP Module
- Apply the model by training SAP Functional consultants
- Administer a survey to include a wider population to arrive at distribution of competencies of SAP Functional Consultants
- Validate the competency model developed

Based on discussion with global subject matter experts in SAP functional competency space and experts in India the researcher has arrived at Initial competency model for a SAP functional consultant.
3.4 Research Questions

Clients in Information Technology Industry have gone from tough to being tougher. Every other deal negotiation ends with a question what more can be done to bring down price points at a higher quality with stringent timelines. In short every client expects a “Carnot” engine at their site to complete the project successfully. SAP projects being niche and complex handling SAP technology engagements are a challenge even when the market scenario is normal. Considering the competition involved and challenges increasing day by day handling SAP projects have become more complex. SAP technology has got two streams the technical stream and the functional stream. While technical stream involves development (coding, technical design etc.) functional stream involves requirement gathering, preparing functional designs, carrying out configuration on the system, testing the configuration, providing user training and support and deploying the solution.
The real challenge is the number of skilled functional consultants availability is very limited an in many real life project scenarios that becomes a limiting factor for SAP engagements.

To give an overview of what a SAP functional consultant needs to deliver given below are key activities what a functional consultant would perform in his/her role:

- A functional consultant understands customer requirement and transforms the essence into an abstractive business model
- Has customizing skills with specific ERP product in the respective business area and confirms system reaction according to the requested business process.
- Is capable of documenting the configuration settings and prepares proper guidelines which enable other consultants to do further changes as an when required.
- The consultant is capable of delivering proper training to the users is capable of analyzing if the system is performing with the right business process flow.
- After the ERP system gets deployed the functional consultant should be capable of addressing post implementation issues and is knowledgeable in proposing required enhancements to the system.
- Is expected to bring in the knowledge that he/she has gathered with multiple ERP Engagements that he/she has worked with and is capable of suggesting suitable options to the client.

To address this scenario Industry has been looking to research community to come out with out of the box thinking and suggestions on the following:

- What impact does business process knowledge have against SAP Module Knowledge when it comes to SAP functional consulting?
• What are the other competency factors that influence competency of a SAP functional consultant apart from business process knowledge and SAP product knowledge?

• Do we know the threshold and differentiating competencies for competency factors that influence competency of SAP functional consultants?

• Is there a possibility by which Industry can identify skilled functional consultants before onboarding them to the projects to increase client service orientation?

• This will help an organization have people with different competency and experience to handle client facing roles

• What are the factors that make Subject Matter experts (SME’s) believe that the functional consultant is skilled and what are the building blocks in making a successful SAP functional consultant?

• Is there a way to impart these skills to junior resources aspiring to be SAP functional consultants?

• Does the requirement/expectation from a functional consultant stay firm or does it change with the demand and economy?

3.5 Research Hypothesis

Based on the above research questions the researcher has framed few hypothesis and worked towards collecting information and data with which the hypothesis could be tested. The hypothesis thus framed have been enlisted below

Hypothesis 1

• H1₀ - Business process knowledge and SAP Module knowledge have equal importance when it comes to competencies of a SAP functional consultant.

• H1₁ - Business process knowledge and SAP Module knowledge does not have equal importance when it comes to competencies of a SAP functional consultant.
Hypothesis 2
- \( H_2_0 \) Competence of SAP functional consultant is equally impacted by all seven competency factors identified.
- \( H_2_1 \) Competence of SAP functional consultant is not equally impacted by all seven competency factors identified.

Hypothesis-3
- \( H_3_0 \) SD Consultant having strong knowledge on Stock transport order has higher competence on SAP SD module.
- \( H_3_1 \) SD Consultant having strong knowledge on Stock transport order does not necessarily have higher competence on SAP SD module.

Hypothesis-4
- \( H_4_0 \) – PP Consultant having strong knowledge on variant configuration has higher competence on SAP PP module.
- \( H_4_1 \) – PP Consultant having strong knowledge on variant configuration does not necessarily have higher competence on SAP PP module.

Hypothesis 5
- \( H_5_0 \) FICO Consultant having strong knowledge on asset accounting has higher competence on SAP FICO module.
- \( H_5_1 \) FICO Consultant having strong knowledge on asset accounting does not necessarily have higher competence on SAP FICO module.

Hypothesis 6
- \( H_6_0 \) MM Consultant having strong knowledge on Inventory management has higher competence on SAP MM module.
- \( H_6_1 \) MM Consultant having strong knowledge on Inventory management does not necessarily have higher competence on SAP MM Module.
3.6 Scope of the Study

3.6.1 Geographical Scope

Geographically this research work is carried out with SAP functional consultants in India. This also includes consultants who could have travelled to onshore (global) locations for any project assignment.

The subject matter experts who are respondents for this research work are from different segments:

- SAP experts from India who work at onshore client location on a project work.
- SAP experts from different countries who have experience working with SAP consultants from India.
- SAP experts who are working out of India and are from India.
- SAP experts who are working out of India but are on an assignment from a foreign country to India.

3.6.2 Technical Scope

The technical scope of the research is:

- Target population for research is SAP Functional consultants in India.
- Competencies which are applicable for the SAP functional consultant’s role will only be analysed.
- The following core SAP functional modules are considered in scope:
  - SAP SD – Sales and Distribution.
  - SAP MM – Materials Management.
  - SAP PP– Production Planning.
  - SAP FICO – Finance and Controlling.
3.7  Challenges of the Study

Previous Research in this Space

While there are earlier researches on Competency Modelling and analysis the study of Competency in SAP field is very limited and not much of Literature availability in this field is noticed. Hence, it is as good as starting from scratch for this study.

Response from target population

➤ Respondent population agreeing to provide inputs is a challenge as there is lot of confidentiality involved.

➤ There are cases where the subject matter expert (SME) group has asked that they should not be named in research or articles that are emerging out of this research.

➤ Organizations in most of the cases are not supportive of their SAP experts being interviewed for competency assessment by external resources/researchers due to fear of poaching.

➤ Leading organizations do not provide numbers (number of SAP functional consultants) with them which is critical for determining sample size requirements for the research.

➤ Global subject matter experts (SME) expressed that their experience and thoughts over the competency of Functional consultants in India, if known to organization leadership could affect their career aspirations in the organization.

➤ Many experts when approached for an in camera interview preferred to answer through their personal emails and over telephone rather that in camera interviews.
3.7.1 Legal issues that could arise out of this Research

- Researcher had to be careful on observations, comments, Inferences provided by participants to make sure that it does not direct to performance and non-performance of an ERP product.
- Researcher had to provide disclaimers, remove the comments and be open to even withdraw articles from leading journals as it could trigger controversies and legal complications.

3.8 Limitations of the Study

- The study is limited to the SAP Functional consultants from and In India functional consultants whose origin is from other geography are excluded from this study.
- The study is limited to core SAP modules namely Sales and Distribution, Materials Management, Production Planning, Finance and Controlling all other technical and functional modules of SAP is considered out of scope.
- The study is limited to functional consultants of SAP, technical consultants, technical architecture consultants or any other SAP related consultant population is considered out of scope.
- Acceptance and availability of SAP subject matter experts was a serious limiting factor.
- Organizations ready to provide contact details and co-ordinates of SAP Functional consultants was a limiting factor.
- Delayed response from respondents resulting in a longer waiting time for the researcher.
- Possibility to contact the same subject matter expert population (SME) for the second or the third time as they were moving between places and organizations, in certain cases even countries.
3.9 Research Plan

The research plan was to “Start from Scratch” and proceed on a step by step approach to build a competency model. The important aspect researcher had to take care was to address requirements that were to be met from different sources (e.g.) data was to be collected to establish list of competency factors that were not from the technical side and at the same time concentrate on collecting information to come out with building blocks that need to be established for functional modules. Apart from both non-technical competency factors and finalizing building blocks the researcher had the task of finalizing list of sub-modules and processes which involved discussion with subject matter experts in respective SAP module.

The plan the researcher followed was a step by step approach so that one problem at a time was getting addressed and the research was progressing with right information from right sources. Given below is a detailed research plan that was followed by the researcher which resulted in addressing objectives for this research.

### Table 3.1: Research Plan with aligned with Objectives of the Research

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Methodology /Tools for Data Collection</th>
<th>Analysis</th>
<th>Expected Research Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>To Identify, enlist and classify the competencies of practicing SAP functional consultants</td>
<td>Focus Group Interviews from Subject Matter Experts</td>
<td>Detailed analysis of Focus Group interviews</td>
<td>✓ Base Competencies required for SAP Functional Consultant ✓ Threshold, differentiating Competencies for SAP Functional Consultant</td>
</tr>
<tr>
<td>To map the competencies of practicing SAP functional consultants in India</td>
<td>Focus Group Interviews</td>
<td>Detailed Analysis of Focus group interview and a day in a life observation.</td>
<td>Detailed Break up of Module wise Competency model for a SAP Functional consultant</td>
</tr>
</tbody>
</table>
To develop a competency model for SAP functional consultants in the following SAP functional modules:
- Sales and Distribution
- Materials Management
- Production Planning
- Finance and Controlling

<table>
<thead>
<tr>
<th>Questionnaire (Stratified Random Sampling)</th>
<th>Hypothesis testing with statistical tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>➢ Chi-Square test</td>
</tr>
<tr>
<td></td>
<td>➢ Friedman test</td>
</tr>
<tr>
<td></td>
<td>➢ Garret ranking</td>
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</tbody>
</table>

| Appropriate Ranking of Base competencies |
| Detailed analysis and report of competencies by module |

To Enumerate the factors of importance for development of competencies amongst the SAP functional consultants in India

| Analysis from the data collected through the above mentioned tools |
| Multiple Regression |

| Model of level of importance/factor the following components have in influencing competencies of a SAP Functional Consultant |

To validate the competency model by applying the model in training a group of SAP functional consultants in India

| Training Development and Delivery for SAP functional consultants |
| Subject Matter expert inputs after training |
| Model validation through AMOS |

| Analysis of training outcome resulting in validation of the competency model developed qualitatively and statistical validation through AMOS |

| ➢ Questionnaire and Focus group interviews post training |

3.10 Research Stages

After appropriate survey of literature and discussion with subject matter experts it was decided to design an exploratory study supported with action research. Descriptive research design was applied to study the demographic characteristics of the respondents and inferential analysis to infer the insights. The study was conceived and conducted in stages as indicated below:
3.10.1 Identification of Competency Factors and Related Experience Indicators for ERP Functional consultants In India

Researcher leveraged the following resources for preliminary study

- Articles from leading market analysts (Gartner, Forrester etc.) on
  - SAP functional consulting requirements
  - Success factors in SAP engagements
  - Competencies required for a ERP Manager and Consultant

Based on the preliminary study researcher arrived at non-technical factors that were influencing the competency of a SAP functional consultant. Following this activity the researcher proceeded towards the next step

- Applying Focus Group Interview Method to arrive at the following:
  - Identifying base competency factors required for SAP functional consultants
  - Identifying Threshold and differentiating competencies required for a SAP functional consultant

There are factors that affect competency of a SAP functional consultant which may not fall under the technology domain. The scope of this research is to identify those factors along with the technical factors. The research design has an approach to identify and validate those non-technical competency factors.

There were many methods that were available to the researcher which could be used to gather information to identify competency factors and experience indicators, few of them are listed below:

- Expert Opinion
- Structured Focus Group Interviews
➢ Workshops

➢ Benchmarking

➢ Day In a Life Observation

On an in-depth look into the options available expert opinion and Structured Focus group interviews were tools which gave an opportunity to the researcher to get a close look into the problem as they have been the methods followed in mapping competencies of niche area (Watkins and Bacon, 2004).

Both the methods provided better insight into the issue that the researcher was analyzing along with the following advantages:

- Detailed information from respondent gathering was possible.
- Clear view of the respondent can be recorded for further analysis.
- Experience from experts in a field like ERP functional consulting is very important and critical as there is no academic yardstick available (unlike other fields).
- Time of the respondents were hard to get hence having a structured interview will help the researcher be prepared with required details for gathering information.
- Cost of gathering information through expert opinion and structured interviews were relatively less expensive when compared to a workshop method
- Benchmarked data for a technology area like ERP functional consulting was not readily available with industries and academic sources. Further in Industries where the data was available due to confidentiality reasons sharing was not possible.
Source of Data

Global leaders and experts on ERP functional consulting space from leading organizations were approached for a structured interview.

A structured interview was administered with the respondents. Interviews that were conducted with the experts were video graphed/recorded/documentated with appropriate required instruments. Few interviews where the respondents were requesting for traditional methods the interviews were recorded through traditional methods (their responses stored in written format by the researcher). In specific cases where it was not possible to conduct a structured interview considering the confidentiality factor a discussion with the subject matter expert was carried out and appropriate observations were made by the researcher which has been evaluated with the researchers experience and appropriate academic guidance.

3.10.1.1 Respondent Group and Selection Methodology

As a resource involved in SAP functional consulting and having been with international and Indian multinationals involved in providing SAP services the researcher had access to leaders and experts in the industry. Leaders and experts in the industry were categorized as:

- Subject matter experts who have spent at least more than a decade in SAP functional consulting area.
- Experts should have had hands on experience as a functional consultant and should have experience in the following versions of SAP projects:
  - End to end SAP Implementations
  - SAP roll out to multiple geographical regions
  - SAP Support engagements
- They should have been in an evaluation team and should have evaluated SAP functional consultants from India.
Experts should have seen and overcome challenges faced by a SAP functional consultant
To bring in a balanced response the respondents were selected from
Global pool - SAP experts from western world who have experience working with SAP functional consultants from India.
Onshore subject matter experts – SAP experts from India who have extensively travelled to global locations
Local subject matter experts - SAP experts from India who work out of multiple organizations in India

A total number of 30 respondents who met the criteria as indicated above were interviewed to come out with competency factors and related experience Indicators. Many studies on competency have used this method (Campbell, Cantrill, and Roberts, 2000; Custer et al., 1999; Meijer, Ihnenfeldt, et al., 2003, Watkins and Bacon, 2004).

3.10.2 Identification of building blocks for SAP Functional modules which influences competency of SAP Functional Consultant

This is an important activity from a SAP competency point of view, while step 1 concentrated on competency factors that were non-technical this step concentrates on pulling out basic technical building blocks that will impact competency of a SAP functional consultant

- Focus Group Interview Method was applied with SAP Engagement leads and Subject matter experts to finalize building blocks for a competency model.

- Selected pool of functional consultants who meet, exceed and fall below the performance criteria were identified based on discussions with Project leads and SAP Subject Matter experts.
• Functional Consultants were grouped by Module and individual discussions with 40 functional consultants were held. The outcome of the discussions formed the basis of building blocks within the respective SAP Module. Many studies on competency have used this method (Campbell, Cantrill, and Roberts, 2000; Custer et al., 1999; Meijer, Ihnenfeldt, et al., 2003, Watkins and Bacon, 2004).
• After discussions a common model of building blocks was arrived at.
• The building blocks thus designed were circulated/shared with consultants and a common understanding was arrived at based on which the building blocks were finalized.

3.10.3 Identify and Validate Attributes Inside Building Blocks by SAP Module

➢ The basic building blocks that were built in step two served as a starting point here.
➢ For every block the researcher arrived at a list of attributes to be included in the block by module based on inputs from video graphed and audio recordings from subject matter experts.
➢ The lists of attributes were discussed; deliberated and final lists of attributes by functional module by building block were arrived at.
➢ The outcome of this step was a detailed list of attributes including sub modules and activities for each functional module considered in scope which will have an impact on the competency of a functional consultant.

3.10.4 Validate Attributes in Building Blocks by Day-In-A-Life method

Entry criteria for this step were:
• Base competency factors required for a SAP functional consultant.(non-technical)
• Clear building blocks with list of attributes to be fitted in to a building block which will enable ascertaining competency of a SAP functional consultant. (for all the 4 modules in scope)

• Threshold and differentiating competencies of the base competency factors that have been identified already.

Detailed documentation by SAP Module on kind of work the SAP functional consultants were delivering was done to arrive at which were validated against the attributes that were components of individual SAP module.

In addition to the observation mentioned above the identified respondents were asked to describe in detail about the module they are experts on

➢ What are the processes and sub modules that form part of their module?

➢ Whom do they think is a successful functional consultant and what processes and sub module is he or she expert in?

➢ Given the building blocks where would they fit a particular process or sub module?

➢ Given a detailed list of processes from SAP product catalog do they think any other process or sub module needs to be added to the list that we have identified currently?

➢ What is the outcome if a resource is not having knowledge on any of the process and would they consider them as a competent consultant or not?

To validate what came out of the descriptive interview observing “A day in a life” of a SAP functional consultant was deployed. Direct observation will provide a reality check against the information gathered during interviews. Spending more than half a day or close to full day with a SAP functional consultant would enable the researcher to weed out idealized reports and create a more clear and realistic picture of effective job behaviours.
Based on previous research and suggestions (Anntoinnette D.Lucia and Richard Lepsinger, 1999) it was decided to observe at least three functional consultants per SAP module in scope on the following lines:

- The researcher will observe functional consultants in SAP engagement:
  - Implementation
  - Rolling out a SAP solution that has been implemented
  - Support
- At least three people per module (Anntoinette D. Lucia, Richard Lepsinger; 1999) will be observed in each category from a Subject Matter Expert view:
  - Exceeds
  - Meets
  - Falls Below the expected levels of a SAP Functional Consultant

Observation was planned on a typical working day (i.e. it was discussed with the observed person’s supervisor that if it was a normal workday and was it with or without any escalation from client side.

- In order to make sure that the observation does not change the behavior of the person being observed the observer was in a workstation with the same project team and was away from the main interaction and was unobtrusive.

- It was ensured that the observation happened at least for more than half a day (more than 4.5 hours) on a given day and in many cases it did happen for a complete day.

- The Day-In-the-Life observation format (Anntoinnette D.Lucia and Richard Lepsinger, 1999) was used to record the observation.

- Based on the request from the individual participants and organization that has supported the research it was promised that the documentation related to the discussion will not be
shared, organization names and individual names will not be discussed in a forum or in a common discussion place.

- The outcome of day in a life observation was a complete validated and exited list of process and sub modules that affects the competency of a SAP functional consultant from a technical perspective.

3.10.5 Develop a Competency Model by Module for SAP Functional Consultants

After thorough analysis of outcome from the step above the researcher will come out with a competency model for modules that are identified, the outcome expected is

- Detailed list of competency factors. (non –technical)
- Clear list of sub modules and processes per module.
- Clearly identified Threshold and differentiating competencies.

Additionally the model had the following components:

- General Competencies that affect the competency of a SAP functional Consultant.
  (non – technical factors)
- Threshold and differentiating competencies for those factors.
- Building blocks for building competency of a SAP functional Consultant.
- Detailed sub modules and processes within the building blocks to build competencies of a SAP functional consultant.
3.10.6 Apply the model by training SAP Functional Consultants

In this part of the research the researcher plans to carry out the following:

- Design a detailed training program based on the competency model arrived at and based on discussions with Subject Matter Experts (SME).
- Design Training content, Methodology and duration of training required to address competency of SAP functional consultant.
- Identify trainers, training participants and deliver training.
- Deploy the resources to SAP projects on successful evaluation post training.
- Follow up with resources after the training (6 months after training) and collect their feedback.
- Assess participant performance through supervisor.
- Incorporate changes/corrections to the SAP functional consultant training plan (if required).
- Institutionalize training and competency model with organizations.
Figure 3.2: Flow Diagram Indicating Training Process for SAP Functional Consultants
The module on which resources were to be trained was SAP SD (Sales and Distribution module). The reason for identifying the module was two fold

- Expertise - The researcher being a SAP Sales and Distribution consultant will be in a position to be hands on in designing and delivering the training.
- Demand Gap - The organization that supported this exercise was having a requirement of SAP SD consultants at a very low cost.

3.10.6.1 Identifying Training Participants

While it was important to have the right people attending the training, research team did not put any specific base criteria apart from standard criteria that is set for selection of fresh graduates into the organization. Anyone who has cleared the quantitative written tests, group discussions, Interviews and were recruited had the possibility of attending this training. The primary reason was, as an outcome of this experiment the organization should be in a position to apply this methodology and process to train fresh graduates as functional consultant for ERP engagements. The trainers did have a small discussion as a group in a two hour session to understand the kind of team that they need to train.

3.10.6.2 Training Content

This was one of the important factors that the research and training team concentrated on. While there is a standard set of training content provided by the ERP vendor which is definitely state of the art in terms of configuration and product training on respective module care was taken to build clear and detailed training material based on the building blocks that were arrived at from the research outcome.

The training material included

- Basic sessions on Sales and distribution processes like:
  - What is Sales and how does a sales process go through in an organization?
How do we by a particular product and how does the buying process get reflected in the ERP product?

As a functional consultant what role is to be played to facilitate right implementation of the product and providing right support to the solution that has been implemented

- Training materials for sessions on
  - What role can they expect to perform once they complete training on this functional module and preparing trainees to deliver the role?
  - What kind of challenges do they need to face once they are ready to be deployed into projects?
  - What would be the acceptance level for fresh graduates as functional consultants were set clearly before starting the module training to the trainees?

- Detailed case studies
  - That gave a step by step approach on how does a functional consultant analyze a ERP implementation or a support
  - On roles of functional consultant in ERP implementation, rollout and support projects were provided

Clear hands on sessions with multiple exercises were created and were made ready much before the training sessions started and appropriate care was taken to replicate the required functionalities and sub modules of sales and distribution module. Complete mixes of classroom sessions with complete hands on exercises and SME participation (Subject Matter expert) for critical sub modules were planned.

Normally the training sessions for these kinds of modules are delivered by a single resource for the entire training duration it was decided to have more number of trainers (4
trainers) one trainer at a time with one person to support hands on exercises based on the sub
modules that were to be handled.

Organization leadership interaction (getting at least one person from Senior Management
address the team on what is expected out of them and what can Senior Management do to help
them). The overall duration of the training program was increased from a 4 week program to a 5
week program to address the technical and non-technical competency factors in scope.

3.10.6.3 Minimum requirements to be a trainer and to be part of evaluation process

One of the key challenges faced in leading organizations was getting the right trainer with
right kind of experience and interest towards training. Normally trainers are picked up from the
pool of people who are available in the free pool. People in the free pool are normally free
because they are yet to be assigned to a project or they are just out of a project waiting for the
next assignment. If the training team feels that the trainer available is not up to the expectations
then an external trainer is arranged who would deliver the training.

Researcher observed this process of getting people from external sources resulted in lack
of commitment in the trainers as their role was just to train the new recruits and move out of the
organization after the training while training new recruits on a technology was to some extent
working with this approach, training fresh graduates on functional modules through this mode
was not effective as the trainer was not up to the expectations in many instances which resulted
in no command over the team that gets trained. Researcher put in a very strict norm for
approving a person as a trainer.
Few of the important norms were:

- The trainer should have experience in at least two types (out of three given below) of ERP engagements:
  - ERP Implementation
  - ERP Country rollouts
  - ERP support and Maintenance
- Trainer should have a minimum of three years of experience and should be a hands on subject matter expert in respective module and a certification from ERP vendor was a nice to have (it was not mandatory for the trainer to be certified)
- Trainer should have been an interviewer in the organization for the respective functional module and should have contributed to at least more than 25 interviews in the respective functional module
- The evaluation process that existed was online evaluation, the participants were to answer questions on an online mode and they had to score above 70% (Standard IT Industry norm for in house evaluations) to be declared as participants who have cleared the training. Researcher bought in changes in the evaluation process. Instead of just an online evaluation process the following was implemented:
  - Online examination where the participants had to answer rightly to at least 70% of the questions (which is the norm in Information technology organizations).
  - A detailed face to face Interview with Subject Matter experts (other than people who were trainers) on key areas of respective modules. Questions from subject matter experts were mainly on practical application of learning
A mix of both the steps above decided if the participant has cleared the evaluation. A minimum level of performance on both the aspects above were made mandatory for a participant to clear the evaluation process.

3.10.6.4 **Follow up After the Training**

- In most of the leading technology firms it is noticed that once the training is complete, evaluations are over then the resources that got trained are assigned to the technology free pool. When a project needs functional consultants they look at the free pool available speak with people in the pool and based on the requirement assign free pool resources to respective projects.

- Research team observed that since the acceptance level of fresh graduates as functional consultants was very low this idea needed lot of support and push from the research team and senior management. The senior managers who were requested to spend some time during the training were reached out to and a clear direction from them to the project managers to pick up these new recruits was brought in. It was made sure that they worked under the supervision of a senior consultant in the project team to ensure they received appropriate guidance and support during execution of the project it took 60 business days to get all the resources who got trained to be deployed on projects.

- Separate trainings on other modules apart from SAP Sales and Distribution can also be executed on the same mode and results can be observed.

3.10.7 **Administer a survey to include a wider population to arrive at distribution of competencies of SAP Functional Consultants**

Based on the parameters identified through earlier stages and based on the feedback received from training the researcher planned to develop a detailed questionnaire and get inputs
from Functional consultants across the country to validate the model that has been developed. The objective was to understand if the processes and sub modules included in the competency model was acceptable to a larger population of SAP functional consultants , to confirm if the model strikes a common line of understanding among functional consultants in India. The steps above have taken the research to a stage where an interim competency model is tested and refined. The competency study has clearly differentiated non-technical and technical competencies. The model has the building blocks along with processes and sub modules in the building blocks.

The intention is to take this model beyond training and development, hence a detailed questionnaire was developed and responses were gathered from a larger population across the country from different organizations irrespective of competency levels to see if the model developed was valid and can be used as a validation point when handling SAP technology engagements.

The researcher had a challenge , sample size to be involved in this step as the population can get large here (n >= 55,000 SAP consultants in India.(Twiggy Lo, 2013) . The approach researcher has taken and appropriate analysis and findings have been detailed in the remaining part of the thesis.

3.11 Research Instrument

Various research instruments were used during the course of the research depending upon the requirement. Given below is a table showing details of research instruments used. While research instruments were used appropriate validation of the outcome was made on a regular basis from practitioners after every stage.
Table 3.2: Research Instruments aligned with Objectives of Research

<table>
<thead>
<tr>
<th>S.No</th>
<th>Stage</th>
<th>Research Instrument Used</th>
</tr>
</thead>
</table>
| 1    | Identification of Competency Factors and Related Experience Indicators for ERP Functional consultants In India | ➢ Focus group interviews with Subject Matter Experts  
➢ Video and Audio Recording of the discussions |
| 2    | Identification of building blocks for SAP Functional modules which influences competency of a SAP Functional Consultant | Descriptive Interview method                           |
| 3    | Arrive at Attributes in Building Blocks by SAP Module                | Open Ended Questions and Descriptive Interview Method |
| 4    | Validate Attributes in Building Blocks by SAP Module                | Daily Journal                                          |
| 5    | Apply the model by training SAP Functional consultants              | Descriptive Interviews                                 |
| 6    | Administer a survey to include a wider population to arrive at distribution of competencies of SAP Functional Consultants | Questionnaire                                          |
| 7    | Validate the Competency model developed                             | Questionnaire used in step 6                           |

The research instruments were identified and finalized based on review of literature and earlier studies carried out on Competency Mapping, given below are the references of the earlier work based on which the resource instruments were identified.

Focus Group Interviews of Subject Matter experts for step 1 – In a research work titled “Competencies Needed by Korean HRD Master’s Graduates” in Wiley Periodicals during June’2010 Yonghak Lee has applied focus group interview technique consisting of a series of in-depth structured interviews with Panelists. More reference based on which this decision was
taken dates back to several previous research work on the same lines where a focus group interview technique was applied (Birdir and Pearson, 2000 Cicek and Demirhan, 2001). Further reference where other studies used focus group interview technique are (for example, Campbell, Cantrill, and Roberts, 2000; Custer et al., 1999. The major modification consists in using a structured in-depth interview during the first round and asking panels to rate items prepared by the researcher (Martino, 1983). This study also employed semi structured follow-up discussion on telephone and email as a data collection method. It was useful to explore how focus group panelists perceived which competencies should be modified to fit organizational contexts, such as that of India.

Therefore, the purpose of the interview was essentially twofold: (1) to confirm and elaborate on results gathered from Initial structural in-depth discussions and (2) to determine aspects of threshold and differentiating competencies for a SAP functional consultant. Because of the nature of the in-depth interview, the sample selection may be emergent over the course of the interview, rather than completely developed at the start of the interview process. This allowed inviting research participants who might be able to supply additional information for emerging constructs and categories as the interview process progressed. Forty interviewees were selected. The interviews were conducted in-camera (or) in-person (not recorded in any electronic instrument but documented by the researcher as the respondents were bound by non-disclosure clause) and in certain cases through telephonic discussions (again the discussion was documented and no recording was done as requested by respondents). Other research instruments used for different stages of the research were:

- Questionnaires
- Descriptive Interviews
- Day-in-a-life observation format.
Questionnaire was designed with items measuring competency of the SAP Functional consultants which in turn would explore the possibilities of improving the competencies, hence the performance of a SAP Functional consultant in a SAP engagement. Also, it intends to measure the impact of functional experience/domain expertise and its impact to competency of a functional consultant.

Experts from both academia and the industry were consulted in order to structure the tool with satisfaction and get significant items backed by extensive literature review and market updates.

Information related to their perception with respect to the various dimensions of competency of SAP Functional consultants collected from the respondents at India. 5 point Likert scale was used to find out the perception of the respondent. In addition to this information, demographic details of the respondents were also collected.

- For stage 4 the research instrument used was a day in a life format (Antoinette D.Lucia and Richard Lepsinger, 1999)
- The questionnaire used for stage 6 consisted of ten sections: Section – 1, 2 and 4 consists of guidelines on how to fill up the questionnaire. Section 4 has demographic information and ranking of competency factors, Section 5 has information on other skills (apart from SAP skills). Section 6 is designed to collect information on project methodology, domain knowledge and SAP specific requirements of the respondent. Section 7, 8, 9 and 10 concentrates on specific modules namely Sales and Distribution, Materials Management, Production Planning, Finance and Controlling.
3.12 Pilot Study

After the questionnaire for the research was developed, a pilot study was conducted to check the comprehensibility, ease of understanding and layout. A reference group of 30 members which represented the sample was approached and their responses were recorded by the researcher. Based on the data collection experience with this group the researcher modified certain ambiguous questions, and it was reworded to eliminate the ambiguity.

Initial questionnaire had questions related to multiple modules tagged in a single section, based on the respondent’s feedback sections 7, 8, 9 and 10 were created separately. It was observed that respondents were enthusiastic in answering specific questions related to the module knowledge whereas there was hesitation from the respondents when they handled the questions related to personal information (e.g. email id’s, educational qualification etc.)

3.12.1 Reliability of responses

Reliability of a measure is the ability to yield consistent results (Nunnally, 1988). Several measures of reliability can be ascertained in order to establish the reliability of a measuring instrument. These include test-retest method, equivalent forms, split-halves method and internal consistency methods. Of all the above methods, the internal consistency method requires only one administration and consequently it is supposed to be the most effective, especially in the field studies. Internal consistency is the degree of homogeneity among the items that constitute a measure. Moreover internal consistency method is considered to be the most general form of reliability estimation (Nunnally, 1988). In this method reliability is operationalized as internal consistency, which is the degree of inter-correlations among items that constitute a scale.

Internal consistency is estimated using a reliability coefficient called Cronbach’s alpha (Cronbach, 1951). An alpha value of 0.70 and above is considered to be the criteria for
demonstrating internal consistency (Nunally, 1988). Here Cronbach’s alpha was used by the researcher to determine the reliability of scales. Forty responses were selected for the purpose.

The Cronbach’s alpha values for the scales are shown in the following table.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>No. Of Items</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP SD</td>
<td>30</td>
<td>0.977</td>
</tr>
<tr>
<td>SAP MM</td>
<td>23</td>
<td>0.959</td>
</tr>
<tr>
<td>SAP PP</td>
<td>17</td>
<td>0.934</td>
</tr>
<tr>
<td>SAP FICO</td>
<td>31</td>
<td>0.976</td>
</tr>
<tr>
<td>Other s</td>
<td>15</td>
<td>0.969</td>
</tr>
</tbody>
</table>

3.12.2 Validity of Responses

Content validity is the degree to which elements of an assessment are relevant to and representatives of the targeted construct for a particular assessment purpose. The importance of content validity for the validation of target construct varies depending on how precisely the construct is defined and the degree to which experts agree about the domain and the facts of the construct.

During initial instrument development stages subject matter experts who were involved in focus group and descriptive interviews were reached out to and every part of the questionnaire was validated by lead functional consultants of respective modules. Over and above getting the questionnaire validated by functional consultants initial responses were again validated with lead functional consultants to ascertain that the responses that are being provided by respondents are valid and will support quality analysis during the later part of the research.
3.13 Sample Design

Administering a survey to include a wider population of SAP functional consultants include SAP functional consultants from India who have specialized in one of the following modules:

- Sales and Distribution
- Materials Management
- Production Planning
- Finance and Controlling

The challenge was to ascertain the population of SAP Functional consultants which was not becoming possible due to the following reasons:

- Organizations were not ready to share information on total number of SAP functional consultants working with them.
- On a regular basis there were number of functional consultants coming out of unorganized training centers.
- Organizations were training people on SAP functional consulting and would not share information due to confidentiality issues.

\[
\text{Sample Size } (n) = \frac{Z^2 \cdot p \cdot (1-p)}{C^2}
\]

where in,

- \(Z\) = the value of standard variate at a given confidence level. In this case for a confidence level of 95%, \(Z\) value is found to be 1.96
- \(p\) = Sample proportion expressed as decimal (0.5) is used by the researcher in which case ‘n’ will be the maximum and the sample will yield at least the desired precision.
• \( q = 1 - p \)

• \( C = \) Confidence Interval expressed as decimal

\[
\text{Sample Size (n)} = \frac{1.96^2 \times 0.5 \times 0.5}{0.0388^2}
\]

The sample size was found to be 589 at 94% confidence level and an acceptable error of 0.0388. Questionnaires were distributed across India. SAP Functional consultants population is found distributed across the following cities in India

- Bangalore
- Mumbai
- Kolkata
- Chennai
- Pune
- Hyderabad

Questionnaires were distributed across the cities through email/direct mode and got filled by 589 respondents.

3.14 Data Collection methods

In this study both primary and secondary data were used. Primary data was collected using a structured questionnaire from SAP Functional consultants in India. Secondary data was collected from different sources which include research papers, research reports (Gartner and Forrester) websites, Government sources and Newspapers. Information in this area being scarce and not many people were available to provide information multiple tools were employed to collect data. One of the key challenges in this research was collection of data from the right people. For initial stages of the research data collecting was really challenging and time
consuming as the process involved video/audio capture in most of the cases and documenting the responses in other cases.

Most of the respondents for stage 1 and stage 2 were leaders in the industry who SAP leads of respective geographies in their organizations. They did provide time for discussion after a series of follow up calls; justification messages and majority of them were against sharing their names or organizations they are from. As the information they were sharing were related to the competencies of people employed in their organization and the information if made public could be used as a reference point to identify competencies of resources from their organizations under specific request from their side only approved information is shared along with the thesis submitted (Compact disc audio and video files).

Most of respondents involved have requested to mask their identity when the video recording is being played or when the information is being shared in a larger forum. Considering the sensitivity of the data involved and the impact it could the researcher appreciates the thoughts and suggestions of various organizations due to this reason while we will see information is available for statistically analyzing competency of SAP functional consultants by module by organization researches has refrained from carrying out the analysis. While the challenge on data collection from respondents were of this nature, on the other side challenges on extracting information from Analysts (Gartner, Forester et.al 2009-2013) was very critical. While Gartner (leading analyst for ERP Market players) shared most of the information due to the agreement that the analyst organization holds with the researcher’s organization the acceptance and understanding was that the information should not be shared in a very large forum as the information on which Gartner provides its reports are treated to be very confidential and sensitive.
### Table 3.4: Data Collection Methods aligned with Objectives of Research

<table>
<thead>
<tr>
<th>S.No</th>
<th>Stage</th>
<th>Data Collection Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identification of Competency Factors and Related Experience Indicators for ERP Functional consultants In India</td>
<td>Primary – Focused Group Interview</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secondary – Analyst Reports</td>
</tr>
<tr>
<td>2</td>
<td>Identification of building blocks for SAP Functional modules which influences competency of a SAP Functional Consultant</td>
<td>Primary – Focused Group Interview</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secondary – Analyst Reports method</td>
</tr>
<tr>
<td>3</td>
<td>Arrive at Attributes in Building Blocks by SAP Module</td>
<td>Primary – Focused Group Interview</td>
</tr>
<tr>
<td>4</td>
<td>Validate Attributes in Building Blocks by SAP Module</td>
<td>Primary – Descriptive Interview</td>
</tr>
<tr>
<td>5</td>
<td>Apply the model by training SAP Functional consultants(any one module)</td>
<td>Primary – Descriptive Interview</td>
</tr>
<tr>
<td>6</td>
<td>Administer a survey to include a wider population to arrive at distribution of competencies of SAP Functional Consultants</td>
<td>Primary – Structured Questionnaire</td>
</tr>
<tr>
<td>7</td>
<td>Validate the Competency model developed</td>
<td>Primary-Structure Questionnaire</td>
</tr>
</tbody>
</table>
3.15 Statistical Tool used for Analysis

Consolidation of the data and statistical analysis were done using SPSS Statistical package (Version 16). Chi-Square tests were employed to figure out the association between the various factors influencing competency and the table below depicts various statistical tools used.

Further, the regression analysis helps the researcher to find out the extent of influence of independent variables (Factors Influencing Competency) on the dependent variable (Competency of SAP Functional Consultant). Based on the outcome of these tests, Jag and Sen’s building block model to evaluate competency of a SAP Functional consultant was conceptualized. The results and findings derived from implementing these research methods are reported and discussed in the ensuing chapters.

3.16 Jag and Sen’s building block model to evaluate competency of SAP Functional Consultant

Considering the pattern data collation has revealed and applying the possibility that there will be a need of separate building block model for each module researcher has arrived at four equations which will serve as building block model to evaluate competency of a SAP functional consultant. Given below is the base model that was devised before analysis and interpretation.