Chapter II

RESEARCH METHODOLOGY
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CHAPTER II
RESEARCH METHODOLOGY

2.0 Introduction
As stated in chapter I, the present study attempts to explore the current position and prospects of IAP in public sector companies in the RoY. Therefore, this chapter will summarize and present the research methodology and procedures and techniques employed in the collection of the data, related to the variables under investigation, which includes research model design and selection of the sample, techniques, coding and organizing the data and the selection of the statistical tools.

2.1 Statement of the Problem
Much work has been done in the field of accounting and auditing, but focusing on the IA in PSCs to highlight the professional position of IA characters, which are the regulations, code of ethics, standards, procedures and reporting in the PSCs in reference to the norms lay down by various professional accounting and auditing bodies. Government financial policies, regulations and deviations legislated by the professional bodies in the national level from time to time has not been attempted. It observed that, several aspects of IA still in need to concentrated study, some of which may be presumably due to the inefficiency of laws, regulations, standards, professional educations and/or incapacity of internal auditors in applying these regulations and standards. As well as, misunderstanding the guidelines and operative norms and lack of code of ethics in the Republic of Yemen (RoY) especially in PSCs. Moreover, lack or weakness of benefiting from the improvements occurred in other countries such as India. Therefore, this study analyzes the position of IAP in PSCs in the RoY from different aspects as an applied research to reveal its qualified and efficient aspects for enhancing them, as well as, deficient and weak aspects for recommending the appropriate required actions for developing them. From discussion above, the problem of the study has expressed in two questions, which are “What is the current position of IAP in the RoY, What are the requirements for developing it?”

2.2 Relevance of the Study
The importance of the study comes from it studies of essential subject to the IAP, organizations and the economy of Yemen at all, as well as, public sector companies specifically. The important points are as follows:
1. This study is considered the first study in the RoY, which studies the IAP in public sector companies.
2. The IAing has great importance in our age and thus invites us to study its effects on the efficiency and effectiveness of the organizations and companies.
3. To know the latest improvement of IAP as a modern function and new vistas
4. This study aims to convey new knowledge into the IA practitioners.
5. This research will be conducted in the RoY, which is one of the developing countries so that many other developing countries may get the benefit from it for improve the IA in their companies or organizations.
6. This study aims to give recommendations to the respective government parties to modify the regulations and improve the several aspects of IA function.
7. The results of this research will contribute to develop the IA in the public sector companies, as well as, in all sectors.

2.3 Objectives of the Study
This study in general aims to examine the quality's level of IAP in public sector companies in the RoY for the purpose of developing the weak areas. Therefore, to achieve this general objective, the researcher put the following group of objectives:
   i. To study the several components or aspects of IA as applied in the Public Sector Companies in the RoY in order to develop the weak aspects.
   ii. To know the view of practitioners and academic lecturers to the profession of IA and how far can be developed in the RoY.
   iii. To study to which extent the professional laws and regulations are developed and reliable to contribute toward professionalism IA.
   iv. Two study the availability of code of ethics and practical standards of IA in the RoY, as well as, which code of ethics and standards adopted.
   v. To examine the extent of internal auditors obligation to the regulations, standards if any and systems of IA through their works, responsibilities and authorities.
   vi. To study the relationships level between external and internal auditor (COCA in the case of Public Sector Companies and accounting firm assigned by it).

2.4 Hypotheses
A proposition, condition or principle, which is assumed, perhaps without belief, in order to draw out its logical consequences and by this method to test it in accord with facts, which are known or may be determined. Hypothesis is proposition, which can be put
under the test to determine its validity. The researcher in this study has identified the following hypotheses:

I. IA function done through appropriate procedures.
   I.I. IA department performs its activities according to predesigned plans.
   I.II. Usually, IA department evaluates ICSs.
   I.III. IA department prepares audit programs to use in audit assignments.
   I.IV. The documentation of IA matters is appropriate.

II. The national laws, regulations enhance the professionalism of IA.

III. IA is practicing according to certain professional standards.

IV. IA department is independent in organizational position, as well as, in performing the audit activities.
   IV.I. IA department is independent in organizational position.
   IV.II. IA department is independent in performing the audit activities.

V. Internal auditors are qualified and well trained to perform IA functions.

VI. Internal and external auditors' works are integral and complemented.

VII. IA reports prepared in a manner that helps in improving company performance.

VIII. In the IT environment, the internal auditors are skilled to perform their duties to get the benefit of the computer that assist the audit work.

2.5 Justification of Hypotheses

This study tries to solve the problem of the study through answering its question and achieving its objectives. Hence, IA is a profession has framework has characteristics, which consists of certain components, which put under investigation because they represent the main determinants of IAD. Therefore, any weakness or strength in these determinants is going to weaken or strengthen the IAP. Consequently, for identifying and disclosing the position of IAP in the RoY systematically and subsequently determine the requirements of improving it, the researcher has identified those determinants namely; IA procedures, professional laws and legislations, code of ethics and standards, internal auditor competencies, internal auditor's relationship with external auditor, IA reporting, as well as, according to the mass development of information technology, IA in the IT environment has taking into consideration. For the purpose of studying and analyzing the professional position (availability and quality) of those determinants, the study has expressed them in form of ideal hypotheses put under test and analysis as shown in Chapter V.
2.6 Research Design and Model's Specification

For fulfilling the above objectives and testing the study hypotheses, the researcher has designed the study in a model developed in Equation 2.1 given below, which consists of independent variables that represent the components of IAP. Their level of availability and quality that determine position level of IA see Figure 2.1 Description of the model’s independent variables given in Table 2.1 This model is based on prior research [(Felix, W. L., A. A. Gramling and M. J. Maletta, 2001, 2002), (Joseph A. Hefner, 2006)]. Moreover, it is designed to examine the availability and influence of IA determinants; IA procedures, legalizations and laws, professional standards & code of ethics, independence, internal auditor competences, relations with external auditor, IA reporting and competence of internal auditor in IT environment on IAP. This model is:

\[
Y = \frac{\sum(X_i)}{n}, \quad i = 1, 2, ..., n, \quad n = 8, \quad (2.1)
\]

where:

- \(Y\) IAP level in public sector companies in the RoY,
- \(n\) Number of independent variables,
- \(X_1\) Availability of proper IA procedures,
- \(X_2\) Quality of professional legislations and laws related to IA,
- \(X_3\) Availability of Professional standards and code of ethics regulate IA,
- \(X_4\) Independence level, organisationally and functionally,
- \(X_5\) Competences of internal auditors,
- \(X_6\) Relationships of internal auditor and external auditor,
- \(X_7\) Components and quality of IA reporting and
- \(X_8\) Information system audit.

---

5 This equation has developed for the study model in case give equal weight for all independent variables and other equation has been used for the same in case of weighting the independent variables by different weights which explain in the section of variable weighting of this chapter.
Table 2.1
The expected relations between the dependents and independent variables in the research model
\[ IAP = Y = \frac{\sum (X_i)}{n}, \quad i = 1, 2, ..., n, \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected Sign</th>
<th>Construct</th>
<th>Proxy Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( X_1 )</td>
<td>+</td>
<td>Internal audit procedures</td>
<td>Availability of it (1=strongly not available, 2=not available, 3=natural, 4=available, 5=strongly available).</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>+</td>
<td>Legalizations and laws</td>
<td>Quality (1=strongly weak, 2=weak, 3=natural, 4=good, 5=excellent).</td>
</tr>
<tr>
<td>( X_3 )</td>
<td>+</td>
<td>Standards &amp; code of ethics</td>
<td>Availability of it (1=strongly not available, 2=not available, 3=natural, 4=available, 5=strongly available).</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>+</td>
<td>Independence</td>
<td>Availability of it (1=strongly not available, 2=not available, 3=natural, 4=available, 5=strongly available).</td>
</tr>
<tr>
<td>( X_5 )</td>
<td>+</td>
<td>Internal auditor competences</td>
<td>Quality (1=strongly weak, 2=weak, 3=natural, 4=good, 5=excellent).</td>
</tr>
<tr>
<td>( X_6 )</td>
<td>+</td>
<td>Relations with external auditor</td>
<td>Availability of it (1=strongly not available, 2=not available, 3=natural, 4=available, 5=strongly available).</td>
</tr>
<tr>
<td>( X_7 )</td>
<td>+</td>
<td>Internal audit reporting</td>
<td>Quality (1=strongly weak, 2=weak, 3=natural, 4=good, 5=excellent).</td>
</tr>
<tr>
<td>( X_8 )</td>
<td>+</td>
<td>Information system audit</td>
<td>Quality (1=strongly weak, 2=weak, 3=natural, 4=good, 5=excellent).</td>
</tr>
</tbody>
</table>

Figure 2.1 Study Model

Moreover, this model is consisting of sub models, which mathematically presented in Equations 2.2, 2.3. These two sub models have designed to express the relation between the independent variables \( X_1, X_4 \), as dependent variables in respect with their components or determinants (independent variables). The independent variables of \( X_1 \) (IA procedures) are planning, evaluation of ICSs, IA programs and documentation. The
independent variables of $X_4$ (the independence) are organizational independence and functional independence. This sub model formulated in Equation 2.2:\textsuperscript{5}

$$X_1 = \frac{\sum(Z_{i-1})}{n}, \quad i = 1, 2, \ldots, n,$$

\hspace{1cm} $n = 4,$ \hspace{1cm} (2.2)

where:

\hspace{1cm} $X_1$ Availability of proper IA planning,

\hspace{1cm} $n$ Number of independent variables,

\hspace{1cm} $Z_1$ Availability and application level of IA plan,

\hspace{1cm} $Z_2$ Evaluation of ICSs,

\hspace{1cm} $Z_3$ Availability and application level of IA programs and

\hspace{1cm} $Z_4$ Availability of documentation.

$$X_4 = \frac{K_1+K_2}{2}, \hspace{1cm} (2.3)$$

where:

\hspace{1cm} $X_4$ Level of independence, organisationally and functionally,

\hspace{1cm} $K_1$ Level of organizational independence and

\hspace{1cm} $K_2$ Level of functional independence.

The researcher has used two methods of analysis to obtain the result of research models. First, one sample T test for the different determinants of the model. Second, linear regression for predicting the value of dependent variables through the values obtained for independent variables. For making sure that, the examinations were accurate, reflect the reliable and correct result of research model, the researcher has used two approaches of analysis. First, statistical analysis by using the determinants values themselves. Second, analysis by obtaining the standardized values of variables (z-scores) with assumption of normal distributions of determinants and non normal distributions values (whereas the researcher has tested the normality of distributions for all elements).

\textsuperscript{5} The researcher has given equal weights for all independent variable of the sub models, which designed in Equations 2.2, 2.3.
2.6.1 Variables Weighting

The general components of IA were expressed as independent variables, which their availability and quality’s level that determine position level of IA (dependent variable). The question of what weight assign to each independent variable indicating its importance toward IAP. For example, profession without standards is too difficult to call it profession, so the availability and compliance with element of professional standards has high influence on the IA but in respect of the IA procedures, if there is some weak areas do not highly shackle the profession. For this reason, the researcher has assigned weight (correlation coefficient) for each independent element according to its significance and effect on IAP, which shown in Figure 2.1 above. Therefore, the researcher has developed the following equation to calculate the study result. Moreover, the researcher has analyzed the responses with both ways (equal weights and different weights) and has clarified the difference between the results, which, obtained through the both ways.

\[ Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 \]  

(2.4)

where:

\( \beta \) = effective weights of the independent variable to dependent variable.

\( X_1, X_2, \ldots, X_8 \) = Refer to the specification of Equation 2.1 and Table 2.1.

2.6.2 Rating the Position of IAP

On the base of Office of the Superintendent of Financial Institutions Canada (OSFI) statement, which describes the rating categories for the assessment of the IA [Office of the Superintendent of Financial Institutions Canada (OSFI), July 2002, p. 1] and using the predetermined weighting values on the IAP determinants, scores are expressed as a percentage and aggregated together. Separate scores for the position level of IAP can then be determined. These separate scores are then graded, which assigns ratings for the result of IA position level as follows:

1. (100) per cent indicates a perfect situation or level of IA profession.
2. (75-99) per cent reveals that IA profession level is acceptable and there is no need for any serious action.
3. (50-74) per cent discovers that, IAP level is acceptable with need to some required actions for improvement.
4. (25-49) per cent indicates that, IAP is under developed and there are many of its determinants are weak or unavailable.
5. (0-24) per cent reflects that there is no IAP by any means.
2.7 Research Information Sources

To fulfil the set objectives of the study, both primary and secondary sources of data collection were tapped, the details of which are as under:

2.7.1 Primary Sources

The researcher adopted many instruments and techniques to collect primary data for the study, which were as follows:

- **Field Visits and Preliminary Exploration**
  The researcher did many visits to several public sector companies, which are located in Sana'a governorate, Aden, Ibb and Taiz. The researcher also visited several governments' agencies like the ministry of laws and parliament affairs, ministry of planning, ministry of civil service, ministry of industry and commerce, ministry of finance, central organization for control and audit, Yemeni chartered accountants association, state consultative council, national center for information and accounting departments in several Yemen universities. From all of these visits, the researcher could collect the information he needs and also known the companies that he will conduct interviews and distribute questionnaire to as sample of the study.

- **Open-Ended Interviews**
  After reviewing, the normative literature and developing the theoretical framework to describe and explain IAP in modern organizations the field questions were formulated. Ultimately, the objectives of the interviews in the exploratory phase were to seek out answers to the research questions and begin to evaluate the study’s framework of components and relationships. It was critical that these interview sessions generate quality information in an efficient and effective manner. In addition, the format and structure of the interviews had to be designed in an orderly and directed manner to provide the interviewee with a coherent, topical conversation and to avoid the appearance of a probing of innumerable and possibly unrelated topics. These interviewing were concerns were resolved through a two stages process. First, two major issues were identified for each component. From these four sets of dual issues the open-ended field study questions were developed. The major issues for each theoretical framework component are outlined and the perspective open-ended field study questions are presented.

Therefore, the researcher conducted group and personal meetings and open-ended interviews with several numbers of CAEs, audit section managers, inspection section
managers and senior auditors of public sector companies that are representing the sample of the study see Appendix D, in order to know:
- The current position of IAP in the company,
- The problems and difficulties of IA as viewed by workers managers in this field and
- To get answers to some questions asked by the researcher.

• The Survey Instrument

The researcher designed a special survey questionnaire for this study to collect data that are related to applied section of this study, which depends on the known scales.

The study benefited from some scales that used by (Shields Jeffery, 1991), (Hefner Joseph, 2006), (Striker Karin, 2007), (Woodard Chester, 2000), (Almohamedi, 2001), (alkero, 2001) and (alsaka, 2000). Researcher put some of questions especially those who had not ready scales and those questions that are suited for Yemeni environment. The questionnaire consisted of eight positions that represent the determinants of IAP, as well as, reflect its quality’s level distributed in to three parts that contained 75 questions; sixty-nine shall be filling by all respondents and six questions filled by CAEs only, which have been asked in interviews and repeated in the questionnaire to insure the credibility of interviews responses. The first part of the questionnaire gathered demographic information on respondents. The second part consisted of scale items that utilize a 5-point Likert type scales. The anchors included: 1-strongly disagree to 5- strongly agree while third part consist of two substantive questions.

A self-administered survey questionnaire was used to collect data see Appendix A Some of questionnaires were delivered via the Yemen postal service to the randomly selected sample of public sector companies and the main part of them delivered by the researcher.

Several measures were employed in an effort to enhance the response rate. A cover letter that was signed individually in blue ink and contained the name and address of the respondent in an attempt to show personalization was attached to each questionnaire. A self addressed, stamped envelope was included in the package being mailed. Three weeks after the survey was mailed, a reminder postcard was sent to those who had not returned their survey [Dillman, D. A., 1978.pp.70-74].
2.7.2 Secondary Sources

Along with the primary data, the researcher has also compiled secondary data from various sources like books, researches, previous studies, statistical and issued reports, publications, magazines, journals, newspapers etc.

For the purpose of collecting data, the researcher visited the following libraries, institution and offices:

1) Gokhale Institute of Politics and Economics, Pune, India,
2) Jayakar Library, University of Pune, Pune, India,
3) General library of Taiz University, Taiz, Yemen,
4) Library of B.M.C. College, Pune, India,
5) General library of Sana'a University, Sana'a, Yemen,
6) Library of Alandalus University for Science and Technology, Sana’a, Yemen,
7) General library of the Ministry of Planning, Sana'a, Yemen,
8) Library of ministry of parliament and laws affairs, Yemen,
9) General library of central organization for control and audit, Yemen,
10) General library of chartered accountants institute Mumbai, India,
11) NIBM library, Pune, India,
12) British Council library, Pune, India and
13) British Council library, Sana'a, Yemen.

2.8 Universe of the Study

The study was conducted in public sector companies in Sana'a, Aden and Taiz governorates, in which these companies located in or has branches, since the foundation date of the company until the beginning of 2009.

2.9 Sample Design

The population of this study is public sector companies in Sana'a, Ibb, Taiz and Aden governorates. Research population is the internal auditors of different positions (job title) in public sector companies 2008 that represent CAEs, audit section managers, inspection section managers, senior internal auditors and junior internal auditors). The researcher gave attention to the homogeneity of population that the sample of this study was selected from it and the degree of accuracy. Population size in number of public companies in the RoY is twenty-four companies; sample selected out of the population was nineteen 79 per cent, for more details refer to Chapter V and Appendix D. The researcher has utilized following technique for selecting the sample:
First, a stratified and cluster sampling method was utilized to determine the number of respondents required from each governorate and determine the number of respondents required from each company and branch according to the size of population in each governorate, company and branch. Afterwards, a random sampling was used to select 225 respondents that were distributed in different cities out of 346 the total size of population. The sample (mailing list) for this study was obtained from the statistical annual report of the ministry of industry and trade for the year of 2007, which contains information about the numbers of public sector companies working in different sector that are located in different governorates and cities. The minimum size of sample should be at least 200 to ensure appropriate result and to minimize the chance of getting good or perfect goodness-of-fit indices due to suitable sample size. However, small sample sizes, less 100, are also likely to be problematic because they are likely to result in poor goodness-of-indices. The targeted usable sample size for this study was set at 225\(^7\).

### 2.9.1 Survey Instrument Distributed and Returned

Prior the data analysis it is necessary to explain the sample size, questionnaires distributed and returned and valid and not valid responses:

The Table 2.2 gives detailed description of sample and responses rate; The total number of questionnaires distributed was 225, number of returned was 216 and the 9 questionnaires not returned while the valid and utilized questionnaire in analysis were 202 and twelve were not valid because some of them included missing values and not filled properly.

<table>
<thead>
<tr>
<th>Survey Questionnaire</th>
<th>Governorate</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Head Court</td>
<td>Sana’a</td>
<td>Ibb</td>
<td>Taiz</td>
<td>Aden</td>
</tr>
<tr>
<td>Distributed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Returned</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Returned</td>
<td>106</td>
<td>30</td>
<td>29</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>30</td>
<td>30</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>Returned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Valid</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Valid</td>
<td>101</td>
<td>28</td>
<td>28</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
<td>30</td>
<td>29</td>
<td>18</td>
<td>33</td>
</tr>
</tbody>
</table>

\(^7\) For more details of selected sample in the level of company, branch and governorate refer to Appendix E.
Valid and invalid returned questionnaires were; 204 questionnaires were retuned valid from the whole sample and governorates, which utilized in analysis and twelve questionnaires, were retuned invalid and did not used for analysis, for more details for each governorate see Table 2.3 presented below:

**Table 2.3 Returned Questionnaires (Valid, Invalid)**

<table>
<thead>
<tr>
<th>Branch</th>
<th>Head Courter</th>
<th>Sana’a</th>
<th>Ibb</th>
<th>Taiz</th>
<th>Aden</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned</td>
<td>N</td>
<td>106</td>
<td>30</td>
<td>29</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>49.07</td>
<td>13.89</td>
<td>13.43</td>
<td>8.33</td>
<td>15.28</td>
</tr>
<tr>
<td>Valid</td>
<td>N</td>
<td>101</td>
<td>28</td>
<td>28</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>49.51</td>
<td>13.73</td>
<td>13.73</td>
<td>8.33</td>
<td>14.17</td>
</tr>
<tr>
<td>Invalid</td>
<td>N</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>41.67</td>
<td>16.67</td>
<td>8.33</td>
<td>8.33</td>
<td>25.00</td>
</tr>
</tbody>
</table>
Table 2.4 and Figure 2.5 given below demonstrate the valid sample size used for analysis in each governorate under consideration, which reveal that: 101 (49.51 per cent) respondents in headquarters of the companies, 28 (13.73 per cent) from Sana’a, 28 (13.73 per cent) in Ibb while 17 (8.33 per cent) from Taiz. The left part of respondents in Aden governorate, which was 30 respondents, represents 14.71 per cent of the total selected sample.

<table>
<thead>
<tr>
<th>Returned Valid</th>
<th>Branch</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Courter</td>
<td>101</td>
<td>104</td>
</tr>
<tr>
<td>Sana’a</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Ibb</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Taiz</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>Aden</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 2.4 sample size for each Governorate

Figure 2.5 Sample Size for each Governorate
2.10 Testing Data Collection Instrument

2.10.1 Pilot Test

Since most of the measurement items are developed for the purpose of this study, pre-test of the measurement instrument is necessary to validate the items in the scales. A pre-test of the measurement instrument is conducted in several stages. First, the survey questionnaire has discussed with some experts and professors in some universities to examine it and get their feedback; opinions and suggestions for revising it. List of experts has given in Table 2.5. Second; the survey questionnaire is circulated to several faculties and graduate students in the Departments of Accounting and business administration at college of management sciences in Alandalus University for Science and Technology. Participants are asked to provide feedback regarding the layout, wording and ease of understanding of the measurement items. The feedback has taken into account in the revision of the questionnaire. The revised questionnaire is pre-tested using a convenience sample of CAEs, audit and inspection section managers of public sector companies in the selected cities; this arranged questionnaire is delivered by hand to selected respondents. The responses from pre-test are analyzed to test the reliability and validity of the measurement items. The questionnaire is revised based on the reliability and validity test and the final version of the questionnaire is developed. The questionnaire is produced in a booklet form.

### Table 2.5 Instrument Survey Panel List

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Professor</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. S. V. Kadvetcar</td>
<td>Ph.D. Research Guide and X HoD of Commerce, University of Pune, Pune, India.</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Abdulhamid Manaei Alsayh</td>
<td>HOD of Accounting, Commerce &amp; Economic College, Sana’a University, Sana’a, Yemen.</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Abdulkader Alhauthary</td>
<td>Dean of Managerial Science Faculty, Alandalus University, Sana’a, Yemen.</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Hamid Mokbel Alsharaabi</td>
<td>Prof. at Accounting Department, Commerce &amp; Economic College, Sana’a University, Sana’a, Yemen.</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Sanjay S. Kaptan</td>
<td>HoD of Commerce &amp; Research Center, University of Pune, Pune, India.</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Mohammed Alrafiq</td>
<td>HOD of Banking &amp; Financial Science, Commerce College, University of Dhammar, Dhammar, Yemen.</td>
</tr>
<tr>
<td>7</td>
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### 2.10.2 Validity and Reliability

The quality of any research design must be judged according to its degree of compliance with the test of validity – construct, internal and external – and reliability.

**Construct validity** is “evaluated by investigating what qualities a test measures, i.e. by demonstrating that certain explanatory constructs account to some degree for performance on the test” [American Psychological Association, 1954, p. 14]. On other words, the operational measures of the research are evaluated in terms of their correspondence with the theoretical propositions. Three tactics were used to strengthen the construct validity of this research:

1. Multiple sources of evidence were collected during the field study sessions, including documentation, archival records, interviews and questionnaire.
2. A chain of evidence was established to facilitate the correspondence of constructs to the theoretical framework.
3. In final stages of the research, the results were presented to members of the participating Public sector companies and feedback was solicited to minimize researcher bias and in accurate construct interpretation.

Internal validity is “unambiguity with which we can draw conclusions about the set of observations in particular study” [Runkel, P. J. and J. E. McGrath, 1972, p. 36]. This validity test permits the establishment of relationships among the study’s components. Two of these validity concerns are as follows:

1. The clarity of the questions post during the interviews and the capability of the questionnaire to capture the true responses of the participants.
2. The capacity of the researcher to draw inferences and develop a true understanding of the IA functions studied.

Throughout the interview sessions, participants were encouraged to clarify the interviewer’s questions and elaborate on their own answers. The initial questionnaire was developed from the responses and comments provided by the interviewees in the exploratory phase. In addition, the survey instrument was pretested by professors, experts and practitioners and revised based on their comments prior to distribution in the corroborative phase. Thus, the final questionnaire was written in the language of the participants for details see section of in this chapter pre-test of survey instrument.
The capacity of the research to draw inferences was controlled through two approaches. First, during the analysis phase careful attention was directed to the identification of patterns within the data. Second, in the final phase the research findings and conclusions were presented to the study participants.

External validity is concerned with the generalization of research findings to a larger population or universe. This research study seeks to understand modern IAP and show the way of applying its theoretical framework in public sector companies and others in the RoY and other countries in Middle East with the same systems.

**Reliability** deals with how consistently similar measures will produce similar results [Rosenthal and R. L. Rosnow, 1984, p. 125]. Reliability has two dimensions: repeatability and internal consistency [W. Zikmund, 1997, pp. 80-85]. The dimension of internal consistency refers to the ability of a scale item to correlate with other items of the same scale that are intended to measure the same construct. The adequacy of the individual items and the composites are assessed by measures of reliability and validity. The reliability of the measurement instrument is assessed by the Cronbach’s Alpha reliability and composite reliability. A Cronbach’s Alpha and composite reliability score of 0.924 or higher indicate that the measurement scale that is used to measure a construct is reliable with excellent level. The composite reliability, as calculated with LISREL estimates, is analogous to coefficient alpha and is calculated by the formula provided by Fornell and Larcker (1981) [C, Fornell, and Larcker, 19th February 1981, pp. 39-50]. Validity refers to the accuracy of a measurement, or how well the measurement taps what it is designed to measure [Rosenthal and R. L. Rosnow, 2004, p. 128]. There are different types of validity to be concerned: face/content validity (i.e., the agreement among professionals that the scale is measuring what it is supposed to measure). **Criterion validity** (i.e., the degree of correspondence between a measure and a criterion variable, usually measured by their correlation) and construct validity (i.e., the ability of a measure to confirm a network of related hypotheses generated from a theory based on constructs [Keven, Bo llen, 1989, p. 189]. The face validity of the measurement instrument is assessed by allowing several professors to examine it and provide feedback for revision. Afterwards, the survey instrument is given to 15 graduate students mainly in accounting to solicit feedback, as well as, to check for readability of the questions and estimated time to complete the survey questionnaire. Additionally, a formal pre-test is conducted on a convenience sample. Discriminate validity is assessed for every possible pair of constructs by constraining the estimated correlation parameter...
between them to 1.0 and then performing a chi-square difference test on the values obtained for the constrained and unconstrained models [Anderson, J. and Gerbing, W., 1988, pp. 411-423].

A significantly lower chi-square value in an unconstrained model indicates that discriminate validity is achieved. Convergent validity is assessed from the measurement model by determining whether each indicator is estimated pattern coefficient on its posited underlying construct factor is significant. The value of Cronbach's Alpha for all elements of scale was 88.6 per cent this value is indicates excellent reliability percentage.

2.11 Formulation of Analysis Techniques
Prior to the stage of statistical analysis, the selection of the statistical tools had been determined in accordance with the objective and the nature of the study.

SPSS version 15.0 software (Statistics Package for Social Science) and Gretl version 1.8.0 (Gnu Regression, Econometrics and Time-series Library) were utilized for analyzing the data collected.

Generally, descriptive, as well as, inferential statistics were employed. A brief explanation of these statistical tools or terms will be useful for those who are not familiar with statistics to make the results of the research more accessible.

2.11.1 Descriptive Statistics
In descriptive statistical analysis, the data is summarized and described numerically within a certain group of individuals. No generalizations or conclusions can be drawn beyond such a group.

The Mean (X), Standard Deviation (SD) and Standard Error (SE) are usually used in carrying out descriptive analysis.

The commonest measure of location, or central value, is the arithmetic mean (Commonly abbreviated to "mean" or "average"). It is simply the sum of all the observations divided by their number. In other words, the mean is the sum of all scores divided by the total number of items. In addition, it is the most commonly used and most widely applicable measure of the central tendency of distribution.
The standard deviation, the square root of the variance, is the most frequently used as a measure of spread or dispersion of scores in a distribution or in variability. It aims at finding the variability of all the scores around the mean. The larger standard deviation indicates that the more variability from the central point in the distribution indicating a heterogeneous group. The smaller the standard deviation, the closer the distribution is to the central point, indicating a homogeneous group. The standard deviation tells us how far out from the point of central tendency the individual scores are distributed.

The standard error refers to a statistics used for determining the degree to which the estimate of a population parameter is likely to differ from the computed sample statistics.

2.11.2 Inferential Statistics

In inferential statistical analysis, unlike the descriptive one, generalizations and conclusions are drawn from samples based on observation. It should be noted that statistical inference or generalization is based upon the theory of probability. A variety of different statistical techniques are used to determine the probable degree of accuracy of generalizations about the population from which a sample or set of data is selected. The F-test, the ANOVA and the MANOVA are among the tests used in an inferential statistical analysis.

- The F-test
  The F-test is a statistical device used when comparing two means of two groups. It shows whether the independent variable has an effect on the dependent variable or not.

- Analysis Of Variance (ANOVA)
  The purpose of analysis of variance (ANOVA) is to test significant differences between means. ANOVA technique allows the sampling variation and the testing variation to be separated and their magnitudes estimated. It is also used to find out whether the difference among the means of two groups is significant or not.

The variance is computed as the sum of squared deviations from the overall mean, divided by \( n-1 \) (sample size minus one). The variance is a function of the sums of (deviation) squares, or (SS) is usually referred to as Error variance. However, the SS \( t \) is due to the difference in means between the groups.
To summarize, the purpose of analysis of variance is to test differences in means (for groups or variables) for statistical significance. This is accomplished by analyzing the variance, that is, by portioning the total variance to the component that is due to true random error (i.e., within-group SS) and the components that are due to differences between means. These latter variance components are then tested for statistical significance and, if significant, we reject the null hypothesis of no differences between means and accept the alternative hypothesis that the means (in the population) are different from each other. Hence, ANOVA is a much more flexible and powerful technique where we can test each factor while controlling all others.

- **Multiple Analyses Of Variance (MANOVA)**
The MANOVA is used to compare the mean score of two or more groups. If the overall multivariate test is significant, we conclude that the respective effect is significant.

The researcher also used the following statistical tools for analyzing the result of fieldwork to test the hypotheses:

- **Frequencies and Percentages**: for the purpose of presentation and analysis the answers of respondents.
- **Central Tendency**: several tendency tools were used such as Mean, Median and Mode.
- **Variability or Dispersion** such as:
  - Standard Deviation for determining the important of important and the level of answers of respondents.
  - Variance.
  - S.E. mean.
- **Normal Distribution Test (Normal Distribution Curve)**: Shapiro-Wilk and Kolmogorov-Smirnov test.
- **Correlation Test**: The researcher has utilized Spearman correlation coefficient for measuring the strength (harmony) between two or more ordinal variables to know the correlation between the factors.
- **T Test**: This test utilized to compare one group or sample to the hypothesized population, as well as, to know the significant of relation (One-tailed).
2.12 Utility of the Study

1. For academicians: the study has concentrated on the determinants of IAP therefore, it will help the academicians in including, developing those elements in accounting syllabus. The professional and continuing education programs are too important for enhancing the competencies of the internal auditor, which advised by the study.

2. For researchers: this study considers as essential study of IAP in RoY; hence, it can be a basic base for guiding the future researches. The study has developed a model for assessing the situation of IAP with all of its determinants, which can be utilized by the future researchers and practitioners.

3. For industry: The utility of the study to industry can be achieved through the main objectives of IA, which is helping an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control and governance processes. Therefore, if the recommendations of the study take in to considerations and implementing, consequently, the IAP and internal auditor competencies are going to develop, which will positively reflect on accomplishment of organizations objectives effectively and efficiently.

4. For the society at all: the utility of the study to the all society will materialize through achieving the above utilities of the study to the variant groups.

![Figure 2.6 Utility of the Study](image-url)
2.13 Limitations of the Study

1- Rare of previous studies focusing on IA in the RoY,
2- Rare or lack of references related to the topic of the study in the RoY,
3- The spread geographical area of the study, which covers the main governorates in the RoY in which the branches of selected PSCs distribute in their wide distributed towns,
4- Thoughts of useless of research studies, which found among some of officers in PSCs and
5- While this study is initial study in RoY focusing on IAP and discussing the all components of IA therefore, it has concentrated on the characteristics and professional requirements of internal audit and left the quality of implementation and compliance with these characteristics to the future studies, which some of them have mentioned in the recommendations.