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Citation Analysis in Doctoral Dissertations in Physics: A Quantitative Study

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Abstract: The present study is based on 30691 citations, appended in the 163 theses in physics submitted to Andhra University, Visakhapatnam for the aware of Doctoral Degree during the period 1942-2002. It has been carried out Bibliographic Form-wise distribution of citations, Subject wise distribution of citations, language wise distribution of citations, country wise distribution of citations, country wise distribution of journal citations, average number of author for citation. The Physics researchers referred mostly journal source rather than other sources. Most of the publications cited by the physics researchers were published by developed countries and all the citations were published in English language only.

Keywords: Bibliometric Study, Citation Analysis, Quantitative Study, Physics Theses, Citation Techniques. Bibliometric Methods.

Introduction

Citation analysis is one aspect of Bibliometrics which deals with the study of literature use patterns. It can bring out useful information pertaining to authorship patterns in different disciplines and in different periods, the relative use of literature and different kinds of documents such as books, periodicals reports, theses, patents, standards etc., the rate of obsolescence of documents ranked list of periodicals based on their productivity research productivity in a country, in a language and in a particular subject, by a particular author or scientist or organization etc. The findings and conclusions drawn from such studies, as evinced from the review of previous Bibliometric Studies are helpful solving many of the problems specific to collection management and general management issues like space management, budget management, customization of information services to users etc.

Bibliometrics

Bibliometrics is an emerging thrust research area of Library and information Science. It is the application of mathematical and statistical method for measuring quantitative and qualitative changes in the production of literature in a given area of specialization. Bibliometric studies are used to identify the pattern of publication, authorship and citation analysis with the hope that such regularities can give an insight into the dynamics of the area under consideration. The basic aims of Bibliometrc Studies are to assist the users in locating the existing information.

Citation Analysis

Citation analysis is the most popular technique used in Bibliometrics. Citation studies are useful in elucidating the development of library services in research. Meaningful acquisition becomes possible when the quantum of citation from a particular (journal) or other sources in assessed by the librarians and information managers. Citation

analysis makes easy in weeding out redundant material. Citations can bring-out useful information like authorship pattern in different disciplines, the relative use of different kinds of documents as books, periodicals, reports, theses, patents, standards etc.

Review of Literature

Rangra and others in (1972) studied the coverage of Indian literature on chemistry and chemical technology excluding metallurgy in referativinyi Zhunal-Khimiya, based on the literature reported in Indian science abstracts, and found that only 31 per cent of the literature has been covered in the journal.

Grefrath (1974) a analyzed the citations appended to 308 journals articles in the field of chemistry published in 1963. The results showed that theoretical articles had a longer lifetime than articles on practical aspects.

Dewitt and others in (1980) studied the use of citations as a tool for studying the sociology of chemical research and the feasibility and accuracy of using automatically general data.

Anand (1981) studied the citing pattern of Indian chemists by analyzing the citations in the journal of the Indian Chemical Society for the year 1979. The authorship pattern revealed that papers with two authors were maximum in number according for 50.87 per cent, followed by papers with three authors (31.22%), and single authored papers accounted for 8.52 per cent. The bibliographic form-wise distribution of citations showed that journals accounted for 88.56 per cent of total citations and self-citations accounted for 11.26 per cent.

Lal and Panda (1999), based on 20 doctoral theses in plant pathology submitted to Rajendra Agricultural University, Bihar, India from 1980-1993, gives result of a citation analysis of references used. The applicability of 2 formulations (verbal and graphical) of Bradford's Law of Scatter was tested in 3 separate parameters to avoid arbitrary scattering. The conformation of the verbal and graphic formulations was found to be very close. Suggests that at a practical level, application of the Bradford distribution may provide a means for selecting those journals dealing with a given subject that are the most productive in terms of the number of relevant articles.

Nalini (2003) carried a bibliometric study and analyzed 31 articles on occupational health related problems studied in India and published in journals (most Indian but some in foreign journals) during the year 2000. Examines the institutions originating the articles: the major subject area covered was found to be that of health consequences of chemical and textile workers. Average length of articles, number of authors and the time span and number of citations are also analyzed.

Methodology

Citation analysis is one aspect of Bibliometrics which deals with the study of literature use patterns. It can bring out useful information pertaining to authorship patterns in different disciplines and in different periods, the relative use of literature and different kinds of documents.

Objectives

The main objective of the any citation analysis is to provide useful information to the scholars in searching of literature and to help the library

administration in selection relevant source. The main objectives of the resent study are:

- To trace out the information sources cited by researchers in the field of physics i.e bibliographic form wise distribution of citations in physics.
- To examine the subject wise distributions of citations in physics
- To identify the language wise distribution of citations in physics
- To know the country wise distribution of citations
- To trace out the country wise distribution of journal citations
- To identify the average number of author for citations

Scope

The study is based on 30691 citations, cited in the 163 theses of physics submitted to Andhra University, Visakhapatnam for the award of doctoral degree during the period 1942-2002.

Hypotheses

Hypothesis-1: Journals are the most preferred vehicles of scholarly communication and academic advancement in the sciences.

Hypothesis-2: The literature of Physics is scattered over a wide range of subject.

Hypothesis-3: English is the predominant language in which the physics literature is published.

Hypothesis-4: Major portion of the Physics Literature is published in developed countries.

Hypothesis-5: Compared to individual research collaborative research is predominant in the field of Physics.

Results and Discussions

Bibliographic form-wise Distribution of Citations in Physics

The various sources of information used by researchers in the field of Physics are studied by analysing the citations according to their bibliographic form subject and country of origin. 14 Bibliographic forms of documents appended to the 163 theses covered in the study.

The distribution of citations among different bibliographic forms in Physics is presented in the following Table.

Table – 1: Bibliographic Form-Wise Distribution of Citations in Physics

Sl No	Type of Document	Number of Citations	Percentage	Cumulative Number	Cumulative Percentage
1.	Journals	24759	80.67	24759	80.67
2.	Books	2533	8.25	27292	88.92
3.	Conference Proceedings	1458	4.75	28750	93.67
4.	Manuals	594	1.94	29344	95.61
5.	Memories	650	2.12	29994	97.73
6.	Monographs	334	1.09	30328	98.82
7.	Others	115	0.37	30443	99.19
8.	Patents	99	0.32	30542	99.51
9.	Reports	58	0.19	30600	99.70

10.	Reference Books	36	0.12	30636	99.82
11.	Standards	25	0.08	30661	99.90
12.	Theses	13	0.04	30674	99.94
13.	Unpublished	13	0.04	30687	99.98
14.	Unidentified	4	0.02	30691	100.00

Bibliographic form wise distribution of citations in Physics theses is shown in Table-1. It may be observed from the table that the citations to journals completely topped the list with 24759 (80%) citations. The rest of the citations together accounted only for 20 percent. Among them Books with 2533 citation stood first (8.25%) followed by Reports with 1458 (4.75%) citations stood in the third place.

Analysis of data indicates the importance of journals to the researchers and also their dependence on journals rather than other forms of information sources. This may be due to the fact that the journals are primary sources of latest research information mostly required by the researchers.

Subject wise Distribution of Citations in Physics

Citations cited by researchers might have been scattered over a wide range of subjects that are considered to be the outgrowth of basic physics. Subject-wise analysis of total citations appended to the theses in Physics shows the distribution of citations among various subject specialisation and associated disciplines. This shows the outgrowth of specialisations from a basic discipline on one hand and interdisciplinary nature of the literature on the other hand. The subject-wise distribution of citations in Physics is shown in Table-2

Table – 2: Subject-Wise Distribution of Citations in Physics

Sl. No.	Subject	Number of Citations	Per-centage	Cumulative Number	Cumulative Percentage
1.	Nuclear Physics	9447	30.78	9447	30.78
2.	Ionosphere	5414	17.64	14861	48.42
3.	Spectroscopy	3484	11.35	18345	59.77
4.	Ultrasonics	1592	5.19	19937	64.96
5.	Dielectrics	1286	4.19	21223	69.15
6.	Pure Physics	693	2.26	21916	71.41
7.	Magnetic Hydrodynamics	623	2.03	22539	73.44
8.	Material Science	583	1.90	23122	75.34
9.	Ultrasonic vibrations	576	1.88	23498	77.22
10.	Geophysics	486	1.58	23984	78.80
11.	Acceleration in Resonance Phenomena	456	1.49	24440	80.29
12.	Transient Magnetism of Earth	385	1.25	24825	81.54
13.	Acceleration in Resonance Accelerators	378	1.23	25203	82.77
14.	Electric Measurements	348	1.13	25551	83.90
15.	Electromegnetic Phenomena	335	1.09	25886	84.99
16.	Vibrations	322	1.05	26208	86.04
17.	Applied Mathematics	309	1.01	26517	87.05

18.	Nuclear Structure	308	1.00	26825	88.05
19.	Dielectric Phenomena	265	0.86	27090	88.14
20.	Fundamental Particles	259	0.84	27349	88.99
21.	Electronics	256	0.83	27605	89.91
22.	Magnetism	250	0.81	27855	90.60
23.	Mathematical Physics	248	0.81	28103	91.42
24.	Pyroclectricity and piezoelectricity	243	0.79	28346	92.20
25.	Geology	242	0.79	28588	93.0
26.	Molecular structure	239	0.78	28827	93.79
27.	Mathematics	199	0.65	28827	94.44
28.	Physical structure of Matter	190	0.62	29026	95.50
29.	Aeronomy and space physics	164	0.53	29380	95.58
30.	Magnetic fields and waves	161	0.52	29541	96.10
31.	Heat Reaction	160	0.52	29701	96.62
32.	Thin	137	0.45	29838	97.08
33.	Hydrodynamics	126	0.41	29964	97.49
34.	Analysis of physics	106	0.35	30070	97.86
35.	Electric Dipole	105	0.34	30175	98.18
36.	Synchronous	84	0.27	30259	98.44
37.	X-Ray spectroscopy	78	0.25	30337	98.69
38.	Thermal Effects of currents	76	0.25	30413	98.94
39.	Magnetic Resource	69	0.22	30482	99.16
40.	Electric city	67	0.22	30549	99.38
41.	Vibratises in Air column	64	0.21	30613	99.58
42.	Solid State Physics	45	0.15	30658	99.73
43.	Atomic structure	33	0.11	30691	100.00

The subject wise distribution of citations in Physics is shown in Table-2. It is observed from the table that the cited references in Physics are scattered among 43 subjects. Among them 'Nuclear Physics' stands in the first place with 9447 (31%) citations. The second and third places are occupied by 'Ionosphere' with 5414 (17%) citations and 'Spectroscopy' with 3484 (11%) citations respectively. 'Ultrasonics' and 'Dielectrics' stood at fourth and fifth places with 1592 (5%) and 1286 (4%) respectively.

Language wise Distribution of Citations

It is a known fact that the scientific literature is published in different languages of the world. In other words, the scientific findings are communicated through a variety of languages known to researchers. Their preferences for language medium mostly depend on the language of the source document in which they would like to publish their research findings. There are other reasons like the availability of literature in a particular language researcher's knowledge of foreign languages and the availability of translation facilities. The language wise distribution of the citations cited by the researchers reveals the predominant language in which most of the citations cited are published. Table-3 presents the language wise distribution of citations in Physics. The distribution of physics literature among 15 languages shows its international nature.

Table -3: Language-wise distribution of citations in physics

Sl No	Language	Number of Citations	Percentage	Cumulative Number	Cumulative Percentage
1	English	28135	91.69	28135	91.83
2	German	1032	3.36	29167	95.18
3	Japanese	615	2.00	29782	97.18
4	French	252	0.82	30034	98.01
5	Russian	166	0.54	30200	98.55
6	Swedish	116	0.37	30316	98.92
7	Danish	147	0.47	30463	99.34
8	Italian	107	0.34	30570	99.72
9	Chainese	68	0.22	30638	99.94
10	Other (6 Languages) (Polish, Portugese, Brazil, Belgium, Nepal, Finland) 14+12+10+8+5+4	53	0.17		100.00
	Total	30691		30691	100.00

Languages wise analysis of citations data in the above table reveals clear cut domination of citations in English Language accounting for 91.69 percent of the total citations in Physics. Languages other than English, such as German, Japanese, French, Russian, Swedish, Swiss, Italian, Chinese cover only, 3.36 percent, 2.00 percent, 0.82 percent, 0.54 percent, 0.37 percent 0.47 percent, 0.34 percent, 0.22 percent citations respectively. Rest of the languages like Polish, Portugese, Belzium, Brazil, Nepalese and Finland together grouped under others category account for only 0.17 percent of the total citations.

Country wise Distribution of Citations

The scientific literature in the field of Physics is being published by many countries Geographical distribution of literature cited by researchers in a subject field indicate the research output of a particular country in that subject. The research productivity of the country reflects its scientific progress and development.

Table–4: Country wise distribution of citations in Physics

Sl. No.	Name of the Country	Number of Citations	Percentage	Cumulative Number	Cumulative Percentage
1.	US	15110	49.23	15110	49.23
2.	U.K.	5930	19.32	21040	68.55
3.	India	3799	12.38	24839	80.93
4.	Netherlands	1910	6.22	26749	87.15
5.	German	1257	4.10	28006	91.25
6.	Japan	859	2.80	28865	94.05
7.	France	402	1.31	29267	95.36
8.	Sweden	268	0.87	29535	96.23
9.	Denmark	243	0.79	29778	97.02
10.	Russia	193	0.63	29971	97.65
11.	Italy	184	0.60	30155	98.25
12.	Switzerland	173	0.56	303281	98.81
13.	Australia	132	0.43	30460	99.24
14.	Unidentified	84	0.27	30544	99.51

15.	Chaina	76	0.25	30620	99.76
16.	Poland	18	0.06	30638	99.82
17.	Ireland	14	0.05	30652	99.87
18.	Portugal	12	0.04	30691	100.00
19.	Canada	10	3.9	30691	100.00
20.	Brazil	6			
21.	Belgium	4			
22.	Finland	4			
23.	Nepal	3			

A geographic analysis of citations presented in the above table furnishes information on the range of countries active in the field of Physics and their relative contribution. It also presents country wise distribution of core journals in Physics. While USA takes the top position with its contribution of 49 percent (15110) journals, the UK is second on the list of countries with 5930 (19%). India and Netherlands stood in third and forth place with 3799 (12%) and 1910 (6.22%) citations respectively. The fifth place was occupied by Germany with 1257 (4.10%) contributions. Japan France, Sweden, Denmark, Russia, Italy, Switzerland, Australia have also contributed literature in physics comprising 0.43 to 2.80 percent of the total citations. Contributions from Portugal, Canada, Brazil, Belgium, Finland and Nepal together contributing to less than 0.05% of citations are grouped under 'others' category.

Table – 5: Country Wise Distribution of Citations to Journals in Physics

Sl. **No.**	Name of the Country	Number of Citations	**Percentage**	**Cumulative Number**	**Cumulative Percentage**
1.	U.S.	12576	50.79	12576	50.79
2.	UK	5152	20.81	17728	71.60
3.	Netherlands	1711	6.91	19439	78.51
4.	India	1683	6.80	21122	85.31
5.	Germany	1194	4.82	22316	90.13
6.	Japan	819	3.31	23135	93.44
7.	France	371	1.50	23506	94.94
8.	Sweden	264	1.07	23770	96.01
9.	Denmark	227	0.92	23997	96.93
10.	Italy	174	0.70	24171	97.63
11.	Russia	173	0.70	24344	98.33
12.	Switzerland	161	0.65	24505	98.98
13.	Australia	118	0.48	24623	99.46
14.	Chaina	64	0.26	24687	99.72
15.	Unidentified	18	0.07	24705	99.79
16.	Irland	14	0.06	24719	99.85
17.	Portugal	12	0.05	24731	99.90
18.	Poland	28	0.11	24759	100.00
19.	Canada				
20.	Brazil				
21.	Nepal				
22.	Finland				

Table-5 reveals the geographical distribution of citations to journals cited by the researchers in Physics. It shows the relative research contribution of different countries in the discipline of Physics. While USA takes the top position with its contribution covering 50 percent (12576) citations, UK occupied the second place on the list of

countries contributing to 5152 (20.81%) citations. Netherlands stands third with 1711 (6.91%) citations followed by India in the fourth place with 1683 (6.80%) journal citations. Germany's contribution accounts for 1194 (4.82%) citations. Next place is occupied by Japan with 819 (3.31%) citations. The analysis reveals that the research scholars in physics depend mostly on literature published from USA and UK. Others group comprises contributions from Poland, Canada, Brazil, Nepal & Finland together with (28) citations. Countries contributing to less than 0.05 percent of citations are grouped under 'others' category.

Average Number of Authors per Citation in Physics (Journals, Books, Conference Proceedings Monographs, Manuals & Reference Books)

The growth in the proportion of both collaborative papers and the number of authors in a discipline depends to some extent on the type of research. The average number of authors per citation denotes estimation of the extent of collaboration in a discipline. The average number of authors per citation in Physics.

Table-6: Average Number of Authors per citation in Physics

Year	No. of Citations	No. of Authors	Average No. of Authors
Upto 1869	212	315	1.49
1870-79	12	15	1.25
1880-89	39	41	1.05
1890-99	20	22	1.10
1900-09	115	126	1.10
1910-19	124	144	1.16
1920-29	601	815	1.36
1930-39	2040	2916	1.43
1940-49	1978	2998	1.52
1950-59	7706	13061	1.69
1960-69	8114	15298	1.89
1970-79	4615	10043	2.18
1980-89	1481	3613	2.44
1990-99	362	1002	2.77
2000-2001	1	2	2.00
Total	27420	50411	1.84

The above table presents the average number of authors per citation is Physics. The average number fluctuates somewhat in the beginning but later showed a marked increase. The highest author ratio is 2.77 in the years from 1990-99 and the average number of author per citations for the period is 1.84.

Findings

Validation of Hypotheses:

Based on the testing of the validity of the hypotheses formulated, the researcher arrived at the following conclusions: It is evident from the citation analysis conducted in the present study that journals are the most preferred vehicles of scholarly communication and academic advancement in Physics.

The second hypotheses states that the literature of Physics is scattered over a wide range of subjects. This statement is found to be true in the case of Physics, since the literature of Physics is scattered over 43 subjects. The applied aspect of Physics in Mathematics, Geophysics and Engineering shows the interdisciplinary nature of research in the field.

The third hypotheses states that the literature of Physics is published predominantly in English language. It is founds to be true since a very high percentage of the literature cited in Physics theses is published mainly in English language. It shows the international nature of Physics literature and its global use.

The fourth hypotheses states that major portion of the literature of Physics is published in developed countries. It is found to be valid, since the findings show that most of the literature cited in Physics is mainly published in developed countries like USA, and UK where Research and Development are considered to be priority areas of concern.

The fifth hypotheses states that compared to solo research, collaborative research is predominant in the field of Physics. This statement is found to be valid from 1960 onwards, from which period the shift in emphasis from single authored works to multi-authored works has been noticed. There is significant increase in the works of multiple authors during the last forty years indicating increasing collaborative research in Physics.

Conclusion

Citation analysis, as is well known, has been used or proposed for a wide variety of applications. Since, citations allow a quantitative and computer manipulation of data, citation analysis became easy and more popular. In addition to the general purposes cited by many authors, after having obtained the core journal's list, these journal, can be considered for rapid and wide secondary service treatment to provide current awareness services. Moreover citation analysis helps in identifying a list of non-physics journals which have proved to be of use and which are not easily obtained by other methods.

Citation ranking is an attractive concept. This will be of best use for those libraries working in a well-defined subject area. Citation analysis is however, a useful technique for examining journals in general, mapping fields in these journals or literature as a whole or of a particular country. In spite of the limitations of the technique of citation analysis, because of its many interpretations, it remains interesting.

Information input is crucial for conducting the research activity in any field of knowledge. Scientist's approach to information varies based on the various stages of research activity. Their current needs for information are usually coupled with retrospective information needs. A well high universal finding of many surveys of the literature habits of scientists is that the frequently used of all sources of information are periodicals and typically they account for well over half of all their reading. The same has been traced in the present study. In addition to journals, other sources occasionally referred by scientists include books, conference proceedings, reports, theses, standards and patents. Each of these documents has a specific role to play in the dissemination of research information.

It is hoped that this study would provide some insight into literature use pattern in Physics of Indian researchers in Physics.

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Teacher's English Language Teaching Research Impacts on Pedagogical Decisions

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Abstract: This paper focused on sound research activity on language teaching. If focused on attention towards research and identifying issues that emerge in the activity. Its aims are to locate the areas in the language teaching research. And the quality research has the greatest potential and indicates the future needs of the research. The paper presents the results of a survey representing the multiple method of investigation in the langue teaching area. Moderate methods of teaching research activity were discussed with the sample study. The levels of sound research activity are analyzed in relation to two key factors that are examined in the survey. The teacher's conceptions of research and their views and response regarding the institutional research culture that shown impact on pedagogical decisions.

Keywords: Research activity; English language teaching, pedagogical decisions.

Introduction:

In the present English language teaching research activity has been suffering from quality deficit. So the concern researchers are very careful about quality research and teaching (eg Hargreaves 1996: Tooley & Darby, 1998). As Lazaraton (2003a) has strongly claimed about the quality research who thoroughly reviewed the evaluative criteria. Who focused on applied linguistics is the strong base for sound research and teaching. This opened the insights into the process of language teaching and learning. It has become a thrust area for research and gives a way for future needs of the language teaching and research. It begins with current research trends, debates, workshops, seminars and conferences and Journal Publications. The present researchers have through attention on the issues of quality and quantitative research, (Holiday 2007). In recent years it has been characterized by a drive to engage class room by the langue teachers. The effective class room teaching depends on langue teaching research. the professional development depends on effective class room teaching and research. (eg. Davies, 1999, Elliot, 2002; Thomas & Pring 2004).

The basic argument is that when a teacher do sound research that impacts on pedagogical decision, further it impacts teaching, research and learning that could give larger benefit. The English language teaching research contributes the understanding of teaching happenings in the class room and teachers response towards teaching practice, and their approach for their teaching abilities development. (Miller & Aldred 2000: Mangubhai etal 2004, 2005 Nazari 2007). The validity of serious research practice based on evidence (eg. Maxwell, 2004, Marrison, 2001) it shows relationship between research and professional practice. It is generally practiced and more informed use and involvement in research by the teacher can enhance their quality in teaching practice. Their quality and quantity language teaching and research shows there beliefs and the

nature of research. it could be understood in different situation and contests. Research is considered a long time dominated by the positivism based on the assumptions, tests hypotheses about the research. the research problem can be answered through a process of doing careful experimentation by constructivism, that denied the objectification of knowledge, instead to understand, through locally situated investigation.

The participants instructional and research, analyses and perspectives are recognized and reflected by social and historical forces, through research theories. It is to be debated towards attention of the conceptual and methodological issues of the research (Bryman 2006: 113). As perry's (2005) suggests that all research can be placed on quantitative and qualitative doing. Focusing on practical issues rather than conceptual condors. This pragmatic attentive accepts a multiplicity of positions and rejects to impose single version as it places the quality of research, emphasizing centrality of the research problem and the importance of situational factors in the pedagogical decision making (Brannen 2007). In this area of research offers a useful characterization in terms of pursuit, situation list and programmatic perspectives.

Teacher's views on research:

Within the parlance of sound research activity, the cited above the strand of inquiry has focused on examining what teacher actually think about research. (Everton, Galton & Pell, 2000, 2002; MC Namara, 2002: Ratcliffeetal; 2004, Shkedi 1998). This type of rational inquiry has been initiated to promote to identify the impact on an understanding of teacher's conception of research and their role in research. Now I want to argue on key findings. i) Whether research had influenced their pedagogy or interested in research activity. ii) Language teaching research might have an impact on their teaching process. iii) Would research experience, give limited understandings of the nature and process involved in social science research to them. The study also explored the influence of research on teacher's language teaching process. A finding clearly indicates such research indirectly evident through curricula and instructional material. This study assures a qualitative analyses relies the experimental analyses and mixed methods and approaches includes in the qualitative aspect of research (Takahasi 2005). The research in teacher's language teaching shifted towards practical and contextual research issues (Sealey & Carter 2004). The qualitative and quantitative approaches can be integrated and based on interviews with teacher researchers.

Teacher's research activity

The research enquiry has focused on the notion of research activity of the teacher's and institutional involvement. In recent times, there have been a number of funded initiates in our country that aims at increasing teacher's research activity in reviewing on such initiatives, Worrall is examined in order to establish common reason cited, to generate a greater understanding of specific issues in teaching and learning. the present study has highlighted by three reasons, why teacher's did not involve their activity in research a) The lack of external pressure to do so b)Lack of time, and c)personal dispositions. In order to understand the research activity and process in the institutions, Boarder (2005) conducted interviews with educational providers who were known to be

involved in and supportive of practioner research. study of autonomy in feedback that provides useful illustration of how an impressively wide range of methods (questionnaires, interviews, protocols, classroom observation and other relevant documents) can be worked out. In this connection of study the main reason teachers participated in research was found to be a desire to improve the quality of teaching and learning through doing research.

The research activity at the institution level also examined and found they had organizational commitment to participate in research, with recognition of time and resources required to do this. The main influence of the institution on teacher's research activity prioritized in number of other sources (eg. Ebbutt, 2001; Handscamb & Macbeath, 2003; Hemsley-Brown & Sharp, 2003; sharp Eames, sanders & Tomlinson 2005) concluded that "the main barriers to knowledge use are not at the individual resistance, but originated in an institutional culture that does not foster learning". Overall the research has been growing interest in recent times not only in the nature of teacher's activity and research but the institutional role in shaping this activity.

Research Activity in Language Teaching

The teacher's research activity in language teaching occupies a little area. This studies, the notion of research tied to quantitative and statically methods about the role of educational research in the teacher's professional lives. The teachers researchers have continued to build on quality research, it contributes to our understanding of what happens in language classrooms and analyses, the teacher's perceptions and their approaches. It shows contradictory results of research on teaching learning process and many teachers are stereotypes though provoking to many teacher's teachings and research towards language teaching (Wu & Fang's (2002). In the context of second language teaching process in India, it is stereotype, exposing and dynamic interplay of experience, belief and practice, findings supported by research. This yields further research. And also discussed in detail the conditions of teacher's work may suffer against research activity and the strategies through which teacher research activity might be achieved (Burton,1997, 1998, Burton & Mickan, 1993). This has included such as attitudes, factors and knowledge and skills. Which factor may support or discourage them from involving in research. These issues have become this strong evidence which can promote initiatives aimed at promoting research activity.

Method

The present study has adopted method in form of a questionnaire, the cross sectional surveys, class room interactions and interviews the data the earlier studies information in standardized manner. The combination of genre and analyses are focused on group interviews to explore teaching perspectives.

Administration

The questionnaire was administered to teachers on workshops, ELT programme at Indian university level. All 31 teachers teaching on the programme were invited to complete the questionnaire which was distributed and collected.

Results

Questionnaires were responded by 19 teachers representing a response rate of 80.6%. The data were analyzed using SPSS12. Section 1 asked about (i) The country where teachers work (ii) Years of experience as an English Teacher (iii) Qualification with regard to ELT (iv) Type of institution / University / Deemed University (v) Whether it is affiliated to a university (vi) The age of the learners respondents taught most often. As part of the research programme the questionnaires will be administered to teachers in respect of contexts around the institution. And this information is used for comparison, the respondents were homogenous in several respects and this was reflected in their responses 1,4,5 and 6 they all worked at Universities, teaching student in their early 22, 23 between. The results to items 2 and 3 in section 1 are summarized in table 1 and 2 below, in terms of experience, the largest group of teachers belonged to 10-14 experience group. Their research problem is revealed with teachers questioning behavior through lesson observation, semi structured interviews and formal group discussions. Hellerman (2006), used longitudinal activity participation in classroom literacy events. Chavez (2007), the influence of cultural and educational background on performance and classroom behavior has also preserved a relevant area for qualitative researchers.

Design

The completed and collected data had six sections. Section 1 The collected data about the teacher's research (Qualification and Experience) Section 2 The use of research scenarios was suggested by the work and their view of research, suggesting the range of activities with different characteristics (Methods, Data, Outputs) and aksed to the teacher's choice. Section 3 Discussion of different approaches to research in order to investigate the characteristics of the quality of the piece of research work. Section 4 Institutional attitudes to research was suggested by the empirical work. Section 5 & 6 Why teachers do and do not involving research. While in terms of qualifications stands out almost 67.3% of the teachers are Masters degree in English Language and Literature. This reflects the university based EFL context in which this study develops.

Evaluating Research Activity

In Section 2 the sue research scenarios, the teachers were asked to indicate at what extent the handled activities described in ten scenarios, whether they want or do not want to do research in Table 3 the findings for this question are summarized in Table 4.

Table 1: Response by Teaching experience

Years	Number	%
0-4	1	2.0
5-9	3	25.0
10-14	17	33.3
15-19	4	16.8
20-24	4	10.4
25+	2	12.5
Total	31	100

Table 2: Response by highest teaching qualification

Qualification	Number	%
Certificate Course	1	2.0
Diploma	4	12.2
M.A	4	8.2

Linguistics		
M.A lang. lit	21	67.3
Doctorate	1	10.2
Total	31	100

Percentage of teachers selecting each of the four possible rating for reach scenario these results falls into two categories for each scenario 'Not research' and 'probably not research' and Research (probably research and definitely research). This indicates the overall direction of the teacher's responses to emerge more clearly.

While defining research is itself not straight forward issue, it is possible to extract from the research methodology literature. A member of commonly cited elements. A problem or question, dta, analysis, interpretation. These factors will be borne in mid as the results to this question are analyzed.

Table 3: Scenarios rated by teachers

1. A teacher noticed that an activity it not used for effective class and thought about this after the class and made some notes in the diary. Tried something different in the next class.
2. A teacher read about a new approach to teaching and writing and decided to try out in the next class.
3. A teacher was doing an MA course it read several books and articles about grammar teacher.
4. A university teacher gave a questionnaire about the use of computers in language teaching. Statistics were used to analyse the questionnaires and wrote about in Journals.
5. Two teachers were both interested in discipline and observed each other's lessons once a week for 3months. And wrote about and made notes and how they control their class.
6. To find out which of two methods for teaching vocabulary was more effective, that was tested in the two class.
7. A head of the department met every teacher individually and asked them about their working conditions. Accordingly the head of the department made notes about the teachers answers. The same will be reported to the higher ups.
8. a teacher gave lessons to the 30 students and get the response in feedback. The same will be handed over to the teacher and the information will be helpful to decide what to do in the next class.
9. A teacher asked his other participants to write an essay about the ways of motivating the learners of English language. After reading the assignments the teacher trainer decided to write an essay about ideas about motivation. The same would be submitted in the form of article in the professional journal.
10. The head of the department of English wanted to know what teachers thought of the new course book. Later questionnaires responses, will be presented in the staff meeting.

Table 4: Teacher's assessment of ten scenarios

Scenario	Definitely not research (%)	Probably not research (%)	Probably research (%)	Definitely research (%)
1	44.0	24.0	28.0	4.0
2	4.1	12.2	36.7	46.9
3	10.2	20.4	40.8	28.6
4	0	2.0	28.6	69.4
5	6.1	18.4	38.8	36.7
6	4.2	8.3	33.3	54.2
7	14.3	32.7	30.6	22.4
8	28.6	44.9	16.3	10.2
9	18.0	38.0	24.0	20.0
10	12.0	34.0	36.0	18.0

It is clearly indicated from Table4 and Figure 1 that the scenario which was rated as research by most teachers (98%) was number 4 in which a university teachers conducts a large scale survey and analyses the data statically. This was the only scenario out of the 10 where respondent felt that it was definitely not research. This is perhaps not surprising as it does explicitly mention a number of elements (eg. Questionnaires, statics) which teachers often associate with research scenario 6 was highly rated, with 87.5% judging it to be in research category. This two reflects characteristics pre Ph.d tests and post Ph.D tests typically associated with research. scenario8 was that least recognized as research (73.5% placed in the not research category). Asking learners for feedback is a routine pedagogical or administrative activity which is not normally recognized as research and low number of feedback sheets returned and the use to which the information was put in low ratings scenario1 also received a low rating with 68% of teachers rating at as 'not research' Nonetheless 28% of respondents still felt it was 'Probably research' and 4% that was definitely so. The spread of responses was even more pronounced on scenarios 7,9,10. For example on scenario9, while 20% said it was definitely research, 18% said it was definitely not. There are clearly mentioned, which for some teachers were characteristic of research (eg. Perhaps the analysis of data and the writing of an article). In their views thought that this was not research. this item is particularly indicative of the diversity which exists among the teachers in terms of their understandings of what counts as research. Exploring these understandings in more detail (eg. The reasons underlying their assessments of the scenario) will be one goal of the follow up interviews.

The ratings of these scenarios were studied (using spearman's rank correlation) for association with teacher's qualification (banded into two categories – up to MA and Doctorate) and experience (0-9, 10-19, 20+). No significant relationships were found between teachers ratings and their qualifications, experience did relate through to scenario S ($N=48$, $P=0.375$, $P<0.01$) and 9($N=49$, $P=0.311$, $P<0.05$). Though statically significant, the strength of these relationships was weak

suggests that correlation of less than 0.4 is weak and that 0.4-0.6 is moderate), overall, there are no grounds here for concluding that experience is associated with these teachers ratings of the scenarios. It is also interesting note that teachers ratings of the ten scenarios yielded α of 0.82. this figure indicates the scenario scale well and can be considered to addresses a common underlying the teacher conceptions of research.

Characteristics of quality research:

Section3 of the questionnaire focused further in teacher's conceptions of research by asking them to rate the importance to good quality of research. Table5 summarizes the responses to this question. For the purpose of this table 'Less important' includes 'Unimportant' and moderately important ratings for each characteristic while 'More important' constitutes' important and very important responses. The responses are coded in descending order according to the percentage of teachers who indicated that the characteristic was more important.

Te characteristic which was seen overall to be most important was 'The Researcher is objective' - 97.9% which were the important group. 'Hypothesis' are tested was the second most important 21 group. While the third highest rated characteristic was variables are controlled. Taken together, teachers views here reflect a conception of research where objectivity, hypothesis testing and the manipulation of variables are fundamental concern. These findings are similar studies outside ELT. Other notions commonly associated with scientific research, such as the use of experiments generality were not rated highly, while the practical utility of results to teachers received the fifth highest rating here.

Table5: Teacher's views on the importance of 16 research characteristics

Characteristics	Less important (%)	More important (%)
Objective	2.1	97.9
Hypothesis	12.5	87.5
Variables	16.7	79.2
Large sample study	26.5	73.5
Teachers ideas on result	25.0	70.8
Nature of topic studied	27.1	66.7
Information Analysis	37.5	62.5
Large volume of information collection	39.6	60.4
Results published	37.5	56.3
Observation used	40.4	55.3
Practical problem studied	45.8	52.1
Information collected from real class studies	46.8	51.1
Questioners used	45.7	50.0
Experiments used	45.8	46.9
Results apply	56.3	39.6

to ELT contexts		
Interviews used	56.3	37.5

The characteristics teachers were asked to comment on included a number of data collection strategies (eg. Experiments, interviews). The reason for their inclusion is that research can sometimes be directly equated with the use of a specific method (Gorard, 2001) says that research is often strongly associated with surveys or alternatively with interviews. The results do not suggest the data collection method in themselves were exposed to determinant of research quality.

The teachers were asked to suggest further features of good quality research and 11 and 8 teachers respondents made suggestions four referred to the need for research to draw on existing sources, suggesting that it should (i) Culture of Science (ii) Transparency (Dale 2006:79) (iii) Longitudinal (Ortega & Iberri-shea's 2005) (iv) validity (v) Reliability one respondent also mentioned that the way research is communicated as being important.

It's important that research is conveyed to teachers in ways they can understand. Statics for example are not always helpful language teachers unless the results are analyzed verbally. The quality of communication as an important criterion (eg. Boaz & Asby,2003) other conclusions to be drawn from the analysis of the data, the need for a clear statement of the problem being investigated, the choice of topics that are interesting and integrity of the tools used to collect data. Teachers ratings of the 16 characteristics were also analysed in terms of qualifications and experience. Table6 contains the results, these can apply to many ELT contests was in a significant positive relationship to both qualifications and experience. Qualifications were in a negative relationship with the value attached to tactical analysis. This indicates that teacher's ratings of the value of this characteristic decreased as their qualifications increased. And experience was significantly but weakly associated with the teacher's used about the importance in good quality research of topics which are of interest to teachers.

Table 6: Relationship of ratings of research characteristics to qualifications and experience

Characteristics	N	Qualifications P	Experience P
Large sample study	31	- 0.011	-0.097
Large volume of information collection	30	0.009	-0.105
Experiments used	30	0.124	0.111
Hypothesis tested	30	-0.106	0.022
Information Analysis	29	-0.274*	0.098
Information collected from real class studies	30	0.153	0.003

Interviews used	30	-0.189	0.244*
Observation used	28	0.222	0.144
Practical teaching problem studied	29	0.222	0.075
Questioners studied	30	0.034	0.184
Objective research	30	-0.074	0.070
ELT contexts	30	0.331*	0.300
Results are made public	30	0.133	0.201
Teachers ideas on result	30	0.023	-0.008
The topic studied	30	0.080	0.280
Variables controlled	30	-0.027	0.104

* P<0.05 (1 – tailed)

Correlation tells us about they do not indicate whether teachers with different levels of qualification and experience, but they were rated importance of the different research characteristics. In this calculation of the mean ratings for each characteristic allows us to compare whether they were differences in the ratings of research with different qualifications and experience. When qualifications are grouped into three groups but significantly, Doctorate, MA linguistics and MA their rating of the item the results apply to many ELT contexts (upto MA mean rating = 1.55 above MA linguistics mean rating = 2.45 U=117.5, P=0.023) when experience is banded into three groups – 0-9, 10-19 and 20+ and the mean ratings on each characteristic compared, no significant difference are found for any of the characteristics overall, then teacher's ratings of the importance of research characteristics did not differ significantly according to their experience and qualifications.

Research Culture

There is evidence in the literature that institutional culture will influence the extent to which teachers are research engaged. In section 4 the questionnaire aimed to establish teacher's views of the extent to which they worked in an environment which encouraged learning about and doing research, supports taking pedagogical decisions.

Table 7: Institutional research culture according to teachers

Statement	Disagree (%)	Don't know (%)	Agree (%)
Teachers do research themselves	16.0	24.0	60.0
The management encourages teachers to do research	36.0	12.0	52.0
Teachers feel that doing research is an important part of their job	40.0	26.0	34.0
Teachers have access to	6.1	8.2	85.7

research books and journals			
Teachers have opportunities to learn about current research	22.4	8.2	69.4
Teachers talk about research	32.0	30.0	38.0
Teachers are given support to attend ELT conferences	26.0	14.0	60.0
Time for doing research is built into teachers workloads	77.6	4.1	18.4

Table 7 indicates the majority of the teachers agree with five statements (on one item (Teachers Discussion about research) the responses were spread over three categories, while on the remaining two items teacher's views were less positive 40% disagreed that teachers feel that doing research is an important part of their job, while 77.6% disagreed time of doing research built into teacher's workload' overall, though the responses to this question suggest that the institution was seen to constitute a positive context for research engagement, access to research publication was seen to be good, teachers felt they had opportunities to learn about current research, and believed by colleagues to engage in research themselves, and the sound research evidence will boost up their professional development the 8 item viewed as each teacher response and provided an overall measure of their views about institutional research culture.

Conceptions of research

In this study teacher's conceptions of research were mainly associated with the standard of research engagement and viewed as scientific research. the present scenario of research is a large scale survey conducted an academicians and statically analyzed and published. The tendency of teacher's to associate research in more conventional forms of inquiry is reflected in existing studies the standard view of research is basing on the predominant model both generally and specifically in ELT.

Conclusion

In concluding this paper, two pints are to be highlighted that need to be considered in interpreting its findings. it is my goal the sound research can be engaged to study a range of contexts as a part of the quality teacher's research engagement. To generate this issues it could be explored in more detail through follow-up interviews and considering classroom pedagogical experience. In this situation the above substantive findings of this study is to be clear sign, of the exploring the nature and evidence of research engagement and creates and supplements strong pedagogical practices.

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Consumption Pattern of Tribals- A Study in Seetampeta Mandal, Srikakulam District

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The term "Scheduled tribe" first appeared in the Constitution of India. Article 366 (25) defines Scheduled tribes as "such tribes or tribal communities or parts of groups within such tribes or tribal communities as are deemed under Article 342 to be scheduled tribes for the purpose of this Constitution". Article 342 prescribes the procedure to be followed in the matter of specification of scheduled tribes.

The criteria followed for specification of a community as a scheduled tribe is

a) Indications of primitive traits,
b) Distinctive culture,
c) Geographical isolation,
d) Shyness of contact with the community at large, and
e) Backwardness.

This criteria is not spelt out in the Constitution but has become well established. It takes into account the definitions in the 1931 census, the reports of the first backward classes commission (kalelkar), 1955, the Advisory Committee on Revision of SC/ST lists (Lokur Committee), 1965 and the Joint Committee of Parliament on the Scheduled Caste and Scheduled Tribes Orders (Amendment) Bill, 1967 Chanda Committee, 1969.

The tribals constitute 8.2 percent of total population of India. Though they are called by different names in different parts of the country, they have in common, many socio-economic and cultural characteristic features. In the graded socio-economic inequal structure of Indian society, the tribals are at the lowest rung and being poor, lead a substandard and subsistence living. The traders, money lenders, contractors, etc; sordidly exploit the tribals as the latter are innocent and illiterate. Tribal's perpetual indebtedness and alienation of lands aggravated their misery and inflicted their peace and happiness. Tribal revolts in the pre and post independent India have their roots in the inhuman exploitation of tribals.

Tribals in Andhra Pradesh

The State Government of Andhra Pradesh has played a pioneering role in the development of its tribals who constitute 6.6 per cent of the State population by the establishment of Girijan Co-operative Corporation in 1956 with the prime objective of uplifting the tribals through marketing and credit activities. Efficiency in the marketing function of the Corporation is sine-qua-non of the magnitude of economic benefits to tribals. Finance function is one of the determinants of the efficient performance of marketing function. Efficient management of marketing and finance is of paramount important if the Corporation is to function successfully in attainment of its goals

being the maximum benefit to maximum number of tribals.

Tribal economy and its marketing features

The tribals of India are often referred to as Vanajati, Vanavasi, Pahari, Adimjati and Anusuchit Janajati. All these different names denote them as castes of forests, inhabitants of forests, hill dwellers, original communities first settlers, folk people, primitive people or scheduled tribes respectively. Among all these terms, Adivasi is known most extensively and Anusuchit Janjathi or scheduled tribe is the constitutional name covering all the names.

The largest concentration of tribal people in the entire world next to Africa is in India. Tribals in India form the very segment of the weaker sections of the society with their traditional skills and resources. They live in remote and exclusive areas in the forests, on the hill-slopes and plateaus and generally in areas with poor natural resource endowment. This isolation has deprived them out of the fruits of scientific and technological advances on one hand and it has led to their distinctive life-style, cultures and languages on the other hand. Age-old exploitation and repression of tribals by the heartless moneylenders and other rested interests in different spheres of economic activities particularly in the field of credit and marketing have cut them off from the mainstream of socio-economic development of the country over the decades. Due to this, the protection has been envisaged under the Constitution of India to the tribals by the Government of India. As a policy, Govt of India emphasized various steps which prevent alienation of tribals land, ensure fairness in marketing transactions of sale and purchase, avoid cheating by money lenders, liquor-vendors, Contractors etc., by building strong and sound infrastructural facilities in the tribal areas during the plan period.

The glaring features of the tribal economy are the traditional type of agriculture, high rate of illiteracy, inaccessibility to road, low and primitive type of technology, and very low rate of per capita income. The tribals generally grow food crops and the produce is mainly used for domestic consumption. In majority of the cases, the agricultural output is hardly sufficient to sustain the tribal household through out the year. However a marginal quantity of agricultural producer oozes itself into the market, not because there is marketable surplus, but because of their necessity either in lieu of loans taken from the traders in the previous years, or to meet the immediate hard pressing domestic needs. The produce is generally sold in the weekly shandies. Next to agriculture, the tribals draw their sustenance largely from the forests. According to the latest assessment, about 80 million hectares of land is said to be under forest lands and this works out to nearly 20 per cent of the total land area in India, and of which more than 20 per cent is inhabited by the tribals. Besides the agriculture, the tribals are accustomed to collect various items of Minor Forest Produce (M.F.P.) such as gallnut, tamarind, honey, canes, reeds, spices, oil seeds, dry fruits, lac, resins, niger seeds, karanj, kusum, harra, sal seeds, dorigums, chiraji, bamboos, medicines, medicinal items, etc., It is estimated that minor forest produce collection, processing and marketing can generate a gainful employment of 10 million persons per year.

Objectives of the study

The following are the objectives of the present study:

1. To study the socio-economic profile of the tribals of three groups viz savaras, jatapus and gadabas selected from Seetampeta Mandal of Srikakulam District.
2. To examine the consumption patterns of the tribals and also to find out whether there are any significant variations with regard to consumption patterns among the three groups of tribals.

Hypotheses

There is a significant difference among the three categories of tribals on the consumption of cereals, pulses, vegetables, non-vegetarian food items and other consumer non-durables.

Methodology

The factors that contributed to the selection of Srikakulam district for the purpose of the study are: firstly, this is the foremost district in the State to have the thickest density of tribal population per square kilometre; secondly, this is the district in the State which has gone through a historic and voilent revolt of the tribal population as a reaction against various forms of exploitation and injustice caused to them by the traders from the plains. Thirdly, this is the only district in the State where the Integrated Tribal Development Agency Programme was initially started.

The research methodology for the conduct of the present study includes the collection of data and the analysis of data using statistical tools.

The collection of data consists of data from primary sources and secondary sources. The primary data was collected through a structured schedule which consists of socio-economic profile, consumption patters, ownership of durables held by the tribals, family buying decision making, buying habits, place of buying, and mode of buying and miscellaneous items. The secondary data was collected through the review of literature from earlier studies, the information available at various agencies like ITDA, GCC and Non-Governmental organizations etc. The entire study is mostly based upon the primary data with the due support of the secondary sources. The primary data was collected through survey of tribal consumer respondents. The sample numbers of tribal consumer respondents are three hundred who have been selected through multi - stage sampling process and random sampling by item.

These stages of sampling procedures are

- Selection of study areas,
- Identification of respondents,
- Selection of respondents

Socio-Cultural and Religious Traits of Selected Tribes

In Seethammapeta Mandal the important tribes are Savara (Hill and plain) Jatapu and Gadaba. Savaras are one of the important Mundari speaking tribes of India, on linguistic and ethnological grounds. Savaras can be considered as pre-Aryan and pre-Dravidian. Though, there were many sub-divisions among Savaras, broadly they are treated as Konda Savara (Malia Savara) and Kapu Savara. Savaras are divided into a number of endogamous tribes. It has been noted that among sub-tribes the Konda

Savara tribe have restricted themselves to the tracts of hill and jungle covered valleys. But as the plains are approached, traces of amalgamation become apparent, resulting in a hybrid race, whose apperance and manners differ but little from those of the ordinary citizens. The culture of the hill Savara is very ancient and they are considered by Government as primitive tribal groups (PTG) and the Savaras in plains are not considered as PTG in the Srikakulam District. The researcher has observed considerable differences between Konda Savaras and plain Savaras and also they are equally numbered in tribal population of the District.

Socio-Cultural and Religious Traits of Konda Savaras

Tribal groups, most of them even today do not know how to wear the dress properly. They celebrate several festivals of which "AUAM" is an important one. Konda Savaras live in Seethammapeta agency area and in some villages of Kotturu, Bhamini, Veeraghattam, Burza, Hiramadalam and pathapatnam Mandals. In order to communicate their views freely, Konda Savaras have their own dialect called Savara language. The Savara live in parallel rows of linear huts. Each linear hut consists of number of compartments each of which houses a family. The Savara village is called gorjan. The villages are one usually homogenous settlement. In Seethammapeta hill tracts Savara villages are identified relatively isolated and mostly homogenous. In Konda Savara economy, shifting cultivation still plays an important role. Konda Savara do practice terracing, dry and wetland cultivation. Food gathering and hunting are the important subsidiary occupations. Agricultural services in Konda Savara villages are seen operating at different levels and accordingly they extend obligatory services between co-villagers, besides paid services. Within the family one can find division of labour based on sex and age. They are expert terrace cultivators and are known to grow very good varieties of bananas, turmeric and other crops on hill slopes.

Socio-Cultural Religious Traits of Kapu Savaras

The Kapu Savaras who reside in plains are said to retain many of the Savara customs. The Kapu section are treated as denoting pallapu cultivators and considered as Savaras of the low level in their social order. The Kapu Savaras are some times called Kudunga or Baseng, a class name Kapu is referred to them because it implies that the Savaras of this class have adopted the customs of the Hindu Kapus. Savaras lilving in plain areas are also in different categories. Along with the name of Kapu Savara, there are other plain Savaras on the name of Bhima Savara, Tekkali Savara and Sudha Savaras. Among these entire sources Sudha Savaras are vegetarians. All these plain Savaras speak only telugu. These groups of Savaras are found in Seethammapeta, Pathapatnam, Saravakota, Hiramandalam and Mandasa Mandals. Kapu Savara are more found in surrounding mandals of Seethammapeta, Bhima Savara and Sudha Savara are living in Mandasa Mandal and they also speak in Savara language with preponderance of Oriya words. Even in plains of Seethammapeta mandal, Savara villages are identified as homogenous settlements. In villages where Savaras seem to be in living with other trilbes like Jatapu and others there is ethnic segregation in such heterogeneous villages. Jatapus in such cases are given higher social position. The plain Savaras practice terracting, dry and wetland cultivation and their major occupation is cultivation. They are also

adopting new agricultural technology in the irrigated areas.

Socio Cultural and Religious Traits of Jatapus

The Jatapus are defined as a civilized section of the Khonds, who speak Khonds on the hill and Telugu on the plains, and are now practically a distinct caste. They consider themselves superior to the Khonds. The name Jatapus is popularly believed to be abbreviated form of Konda Jatapu Doralu, or lords of the Khonds caste. To this caste, the old chiefs of the palakonda Zamindars are said to have belonged.The Jatapus are a major scheduled tribe in the Srikakulam District. According to 2001 census they are 28,630 in number and the total schedule tribe population of the District is 1,51,249.

The social organization of Jatapus is based into totemic and exogamous groups of class. Among Jatapus the smallest social unit is the nuclear family, spread over by joint or extended families, modernization and new set of social forces have changed the Jatapu social system. Although the breakdown of extended families is the result of natural process of growth and phenomenon of the family units, the operation of divisible forces like wage labour and money economy has accelerated this process in the roadside villages and in semi-urban scheduled areas. Against the tradition of parental properties with the development of individualization, the adult ones began to pressurize and quarrel with their father for the division of family property. So the nuclear family has come to be the production unit in the plain areas. The parents complain that the youth of present generation are not as obedient as they used to be. The traditional behaviour of super-ordination and subordination between older and younger generation remains little affected.

Inter-Tribe Variations in Socio-Cultural and Religious Traits

The above socio-cultural and religious life pattern analysis of the selected tribes reveals, how the different tribes in Seethammapeta mandal responded to the exogenous change agents and modern forces. The Konda Savara, plain Savara and Jatapu tribes are not only popular but also are socially, culturally, ritually dominant tribes in the Srikakulam District. The comparative observation about their socio-cultural and religious life patterns and styles reveal that Jatapu and plain Savara who are living in plains significantly responded to the change agents. The degree of change is more in Jatapu and Kapu Savaras who are residing in the surroundings of Seethammapeta and in roadside villages. However, the degree of change among these tribes is limited in the interior villages which are not having any transport or communication facilities.

The Konda Savara are also showing some degree of change but somewhat less when compared to Jatapu and plain Savara tribes. This reveals that the impact of the change in the life styles of different tribes is not uniform throughout Seethammapeta Mandal. The topography of Seethammapeta itself does not facilitate the spread of alien cultures into the hill tracts and remote interior areas. Co-existence of money economy and barter economy are still found in Konda Savara village. These tribes in the hill tracks and remote interior areas are not so much influenced by the changing agents of modernization. As these areas are far away from Seethammapeta and not easily approachable, the

traditional social, cutlrual and religious organization of Konda Savara in their areas remained largely intact.

Music and dance is a way of life to the tribals of study area and these are important aspects of their cultural heritage. Dancing in the villages provides them opportunity for collective rejoining as well as inculcates in them a sense of cultural solidarity. The traditional patterns of music and dance of the tribes in the study are undergoing change in some aspects, mainly due to the impact of education. Music and dance is slowly becoming less popular among the educated sections of the tribal society. Also the encouragement and support from the government legislation for the progress of tribal music and dance have inculcated a new sense of pride in their music and social ethos which play an important role. Significance of socio-cultural factors cannot be ignored in formulation of schemes for their all-round sustainable development.

The above analysis reveals that the tribes living in plains, particularly Jatapus and Savaras slowly emerged as socially and politically leading communities and dominating the tribal scenario. Even among the plain tribes due to the racial qualities Jatapu tribes are leading politically and socially. The tribes living in the hill and remote areas particularly Konda Savaras are still in back seat of the social and political system.

A study of tribal consumer behavior without studying tribal consumption pattern of various eatables and non-durables will reflect only half the story. Towards this end an attempt is made in this chapter to study their consumption pattern.

Table 1indicates the significant difference in the consumption of cereals, pulses, vegitables, non-veritable food items and edible oil by the Savara, Jathapu and Gadaba tribal category respondents in the study area. It shows that the average consumption of cereals by Gadaba category tribals (38.12) found little higher than Savara (37.44) and Jathapu (37.22), but it is not significant because the calculated f-value is not significant. Regarding the culsumtpion of pulses the average pertaining to Jathapu tribes (40.36) is higher than Savara (39.92) and Gadaba (39.52), and the difference in consumption is not at significant level because the f-value shows 0.140 which is less than the table value. (0.869). The average consumption of vegetables by Savara tribes (8.44) shows higher than Gadaba (8.20) and Jathapu (7.88) tribe groups but do not indicate any significant levels of difference, so the calculated f-value is 0.045. The Jathapu tribe respondents dominated in the consumprion of non-vegetable items with and average of 9.44 and Gadaba and Savara are in the next position

Table – 1: Significance difference on consumption pattern of food items among tribes (in a month)

Items	Tribe category	N	Mean	Std. Deviation	Std. Error	f-value	Sig.
Cereals	Savara	135	37.44	1.717	0.062	2.171	0.116
	Jathapu	90	37.22	1.761	0.080		

	Gadaba	75	38.12	1.736	0.085		
	Total	300	37.59	1.738	0.043		
Pulses	Savara	135	39.92	1.836	0.072	0.140	0.869
	Jathapu	90	40.36	1.848	0.089		
	Gadaba	75	39.52	1.830	0.096		
	Total	300	39.93	1.836	0.048		
Vegetables	Savara	135	8.44	1.745	0.064	0.048	0.953
	Jathapu	90	7.88	1.759	0.080		
	Gadaba	75	8.20	1.751	0.087		
	Total	300	8.17	1.749	0.043		
Non-veg	Savara	135	9.12	1.670	0.058	0.125	0.882
	Jathapu	90	9.44	1.686	0.072		
	Gadaba	75	9.32	1.669	0.077		
	Total	300	9.29	1.672	0.039		
Edible oils	Savara	135	8.84	1.500	0.043	0.114	0.892
	Jathapu	90	8.08	1.502	0.053		
	Gadaba	75	8.28	1.503	0.058		
	Total	300	8.40	1.500	0.029		

with 9.32 and 9.12 respectively. Here also there is no significant difference found between and within the groups in the consumption pattern. The average consumption of edible oil by Jathapu tribes found higher than Gadaba and Savara groups, and the calculated f-value 0.114 is not significant because there is no much difference in their consumption.

The Savara tribe respondents dominated in the consumprion of edible oils with average of 8.84 and Gadaba and Jathapu are in the next position with 8.28 and 8.08 respectively. Here also there is no significant difference found between and within the groups in the consumption pattern. The average consumption of edible oil by Jathapu tribes found higher than Gadaba and Savara groups, and the calculated f-value 0.114 is not significant because there is no much difference in their consumption.

Therefore, the consumption pattern of the above three tribe groups indicates that the Savara tribes are consuming more cereals and vegetables, Jathapu tribes are consuming more pulses and edible oil, but Gadaba tribes are consuming more non-vegetable food items. Hence, the above analysis infers that there is no difference between and within groups of tribes in the consumption pattern of cereals, pulses, vegitables, non-veritable food items and edible oil.

Hence, the above analysis infers that there is no significant difference between and within groups of tribe categories on the priority of consumption of cereals, pulses, vegetables, non-vegetarian food items and other consumer non-durables. Therefore, the hypothesis that there is a significant difference among different tribe category respondents on the consumption of cereals, pulses, vegetables, non-vegetarian food items and other consumer non-durables is rejected.

Table 2 analyses the significant difference in the expenditure on cereals, pulses, vegitables, non-veritable food items and edible oil by the Savara, Jathapu and Gadaba tribal group respondents in the study area. It shows that the average expenditure on cereals by Savara category tribals (Rs 527.14) found higher than Gadaba (Rs 509.66) and Jathapu (Rs 503.04), and the calculated f-value 0.460 did not indicate any significant level because it is less than the table value. Regarding the expenditure on pulses the average rendered by Savara tribes (Rs 294.97) is more than Jathapu (Rs 293.55) and Gadaba (Rs 287.93), and the difference in purchase is not at significant level because the f-value shows 1.422 is less than the table value. The average expenditure of Savara tribes on edible oil (Rs 29.53) found more than than Gadaba (Rs 61.21) and Jathapu (Rs 58.34) groups, and the calculated f-value 1.651 indicates no significance because there is no much difference in their consumption. The average expenditure on vegetables by Savara tribes (Rs 29.53) shows higher than Gadaba (Rs 28.09) and Jathapu (Rs 28.20) tribe groups and did not indicate any significant levels of difference, so the calculated f-value is 1.513. Whereas, the Jathapu tribe groups found more expenditure on non-vegetable food items with an average of 32.39, but the expenditure of Gadaba was Rs 32.20 and Savara was Rs 29.81 in the next position with a small difference. Here also there is no significant difference found between and within the groups in the purchase, and the f-value is observed 0.831 which is not significant.

Table – 2: Significant difference in expenditure on food items among different tribe groups

Item	Tribe category	N	Mean	Std. Deviation	Std. Error	f-value	Sig.
Cereals	Savara	135	527.14	3.160	17.485	0.460	0.632
	Jathapu	90	503.04	0.195	21.102		
	Gadaba	75	509.66	0.763	22.027		
	Total	300	513.28	1.372	11.483		
Pulses	Savara	135	294.97	2.588	8.227	1.422	0.187
	Jathapu	90	293.55	1.083	10.128		
	Gadaba	75	287.93	1.365	10.896		
	Total	300	292.15	1.678	5.499		
Edible oil	Savara	135	63.01	0.681	5.622	1.895	0.156

	Jathapu	90	58.34	0.598	6.415		
	Gadaba	75	61.21	1.241	8.145		
	Total	300	60.853	0.840	5.621		
Vegetables	Savara	135	29.53	0.351	8.465	1.513	0.159
	Jathapu	90	26.54	0.871	10.317		
	Gadaba	75	28.2	0.523	11.030		
	Total	300	28.09	0.581	5.621		
Non-vegetables	Savara	135	29.81	1.456	1.588	0.831	0.577
	Jathapu	90	32.39	1.725	1.974		
	Gadaba	75	32.2	1.554	2.258		
	Total	300	527.14	3.160	1.083		

Therefore, the above analysis indicates that the Savara tribe groups are dominating with their expenditure on cereals, pulses, vegetables and edible oil, but the Jathapu tribes put their more expenditure on non-vegetable food items. Hence, the above analysis infers that there is no difference between and within groups of tribes in their expenditure on cereals, pulses, vegitables, non-vegitable food items and edible oil.

HPLC-DAD Estimation of Nebumetone to Demonstrate Cleaning Validation on Stainless Steel Surfaces of the Production lane

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Abstract: The HPLC-DAD method was very rapid, sensitive and precise which developed for the estimation of Nebumetone to Demonstrate Cleaning Validation on Stainless Steel Surfaces of the Production lane. The Separation of the drug was achieved on a Phenomenex Luna C_{18} (25 cm×5 µm×4.6 mm i.d.) column by using a mobile phase in the ratio consisting of a mixture of methanol:acetonitrile:water (55:30:15, v/v/v). The flow rate was 1 ml/min and the detection wave length 230 nm. The linearity was found in the range of 0.1-4.56 µg/ml with a correlation coefficient of 0.996. The proposed method was validated for its sensitivity, linearity, accuracy and precision. This method was employed for routine quality control analysis of trospium chloride in tablet dosage forms.

Keywords: Nebumetone, Swab-wipes, sampling protocol, HPLC-DAD.

I. Introduction

The part of the Cleaning validation plays an important analytical challenge in pharmaceutical industries. It stems primarily as a part of mandatory for good manufacturing procedure due to the contamination potential. Secondly, for quantitative estimation of residues over the surface of manufacturing equipment after cleaning procedure it requires development of selective and sensitive methods. In the manufacturing lane it involves identification of numerous sampling points to demonstrate complete removal of residues. Current regulatory norms do not establish acceptance limits for residues, but let an analyst decide it on the basis of logical criteria such as risk associated with the quality or safety of finished product.

Generally the limit for maximum accepted residue of active ingredient (maximum allowable carryover, MACO) is based on mathematical formulae, therapeutic doses and toxicological profile, which is kept at a general limit of 10 µg/mL . Several approaches to express acceptance limits have been proposed in the published scientific work. One approach is to compare visual limit of detection (VLOD) with pharmacology based criteria, where not more than 1/1000th of the therapeutic dose of active component should be carried over to the next batch as residue; lower of the two is considered as the residual acceptance criterion. Another approach involves estimating the total amount of allowable residue present on production line, which is termed as residual acceptance level (RAL). Further, the concentration of residue present per unit equipment surface area may be computed, which is termed as specific residual cleaning level (SRCL) or limit per surface area (LSA).

Nabumetone (NAB) is chemically 4-(6-methoxy-2-naphthalenyl)-2-butanone; it is an ester prodrug of a new generation of effective and orally active angiotensin-II receptor antagonist. It blocks the vasoconstrictor and aldosterone-secreting effects of

angiotensin-II, one of the most important regulators of blood pressure. The determination of NAB from tablet formulation has been carried out by high performance liquid chromatography (HPLC), high performance thin layer chromatography (HPTLC) and spectrophotometer, alone or in combination. Several analytical methods have been reported for their determination alone or in combination with other drugs in different dosage forms, biological fluids and urine using different analytical techniques . Available literature revealed that no method related to residual determination of NAB was reported so far; hence it was found worthwhile to determine LSA of NAB and to carry out the development and validation of the method in order to ensure trace level estimation of residues and to demonstrate efficiency of the cleaning procedure.

Experimental Reagent and Chemicals

NAB reference standard (USP) was obtained from IPCA Labs, Ratlam, Madhya Pradesh, India, as a gratis sample. Nilitis (NAB, 500 mg) tablets were procured from the manufacturer. HPLC grade water was prepared by taking reverse osmosis water and passing it through a Milli-Q System (Millipore, Milford, USA). Alpha Swab polyester on a propylene handle-TX714A (ITW Tex wipe, USA) was used for extraction recovery sampling. HPLC grade acetonitrile and methanol were obtained from Merck, Germany. All other chemicals used were of analytical grade.

Chromatographic system and conditions

The LC system consisted of a (Shimadzu LC 10AT VP) gradient pump with a universal loop injector (Rheodyne 7725i) of 20 µL injection capacity, a photodiode array detector (PDA), SPD-10 AVP and Phenomenex Luna C_{18} (25 cm×5 µm×4.6 mm i.d.) column at 1.0 mL/min flow rate, using 20 µL injection volume controlled by a PC work station equipped with the software CLASS-VP (software M-10, version 1.6; Shimadzu. Tokyo, Japan). Column temperature was ambient. The mobile phase consisted of a mixture of methanol:acetonitrile:water (55:30:15, v/v/v). The mobile phase solution was filtered through a 0.45 µm membrane filter (Millipore) and degassed prior to use. The extraction solution consisted of 60 mL mobile phase solution, 20 mL methanol and 20 mL water (50:20:30, v/v/v). All chromatographic experiments were performed in the isocratic mode. UV detection was performed at 230 nm. The method was validated as per ICH guidelines. The statistical analysis was performed using Microsoft Excel 2007.

Standard solution preparation

The stock solution of standard was prepared by accurately weighing NAB reference standard and transferring to a 50 mL volumetric flask. 20 mL of methanol was added and the content of flask was sonicated for 30 min. The solution was appropriately diluted with the mobile phase to get the final concentration of 0.020 mg/mL. A series of calibration standards were prepared by transferring appropriate aliquots of standard NAB solutions to separate 100 mL volumetric flasks to get dilutions.

Sample solution preparation

10 cm×10 cm of a stainless steel surface, appropriately cleaned and dried, was sprayed with 250 µL of standard stock solution for the positive swab control at all concentration levels, and the solvent was allowed to evaporate. The surface was wiped using a wet cotton swab, soaked with extraction solution (mobile phase:methanol:water;

60:20:20, v/v/v). The swab was squeezed into the swab tube as per the procedure mentioned below. The background control sample was prepared from the extraction solvent. The negative swab control was prepared similarly. Care was taken to avoid contact of swab with the test surface. Subsequently, the tubes were placed in an ultrasonic bath for 15 min and the solutions were analyzed by HPLC-DAD.

Swab wipes sampling protocol

Rinse and swab are two sampling methods available to demonstrate cleaning validation. The swab technique is a technique preferred by United States Food and Drug Administration. The swabbing process is a subjective manual process that involves physical interaction between the swab and the surface, and thus may vary from operator to operator. So, a standardized motion protocol is required to establish reproducible recoveries. A patch of $4\times4in^2$. swab was immersed in the extraction solution and folded diagonally. The excess solution was squeezed to avoid unnecessary dilution of the drug. The folded swab was kept between the thumb and second finger, so that necessary force may be applied over the surface through first finger. The surface was wiped horizontally, starting from outside towards the center. The fresh surface was exposed and repeatedly wiped to extract the maximum residue. Finally the swab was secured in a closed and labeled container for estimation.

Acceptance limit calculation

Cleaning validation of production lane is one of the most critically controlled tasks. Visual as well as analytical observations help to achieve the goal. Considering SRCL, VLOD, MACO and stainless steel surface area of 10 cm×10 cm, the calculated limit per surface area (LSA) was decided as 2 µg swab per 100 cm^2.

Optimization of chromatographic conditions

Best chromatographic conditions were achieved by optimizing the wavelength for detection, mobile phase composition and flow rate. The mobile phase consisted of a mixture of 55 mL methanol, 30 mL acetonitrile, and 15 mL water (55:30:15, v/v/v). Chromatographic conditions were optimized to achieve appropriate plate numbers, peak symmetry, resolution and tailing factor. The calibration curve showed good linearity for lower concentrations, required for trace level estimations at 230 nm.

Optimization of sample treatment

Cotton swabs were spiked with different quantities of drug and placed into tubes. The optimum conditions were achieved with mobile phase:methanol:water (60:20:20, v/v/v) as the extracting solvent and sonification time of 15 min.

Validation of the method

The main objective of this study was to develop an HPLC-DAD method for estimation of residues collected by swabs, without interference of impurities originating from the swabs, plates and extraction media. The method was validated for linearity, precision, limit of detection (LOD), limit of quantification (LOQ), accuracy, selectivity, and stability of analyte .

System suitability

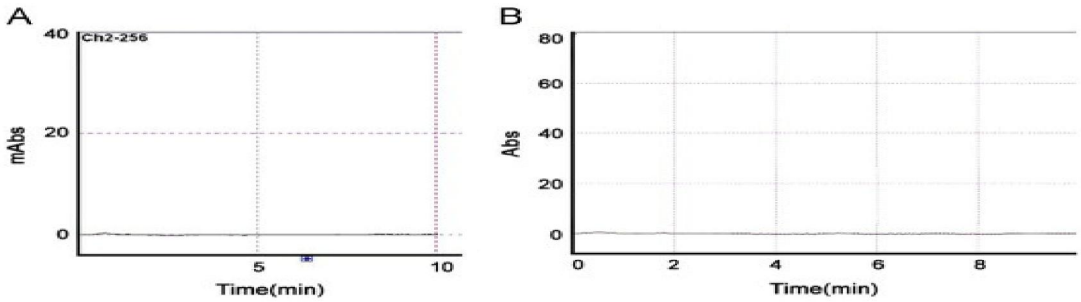
The average number of theoretical plates per column was >3400, the USP tailing factor <1.2 and

the resolution >2.0. Relative standard deviation (RSD) of the peak areas was <2.0%.

Specificity

The specificity of the method was checked by using standard, samples, the background control sample, the negative swab control, and a swabbed un-spiked stainless steel plate (Fig. 2), and four standard solutions were subjected to stress conditions, which involved storage under destructive conditions like elevated temperature (75 °C), acid environment, basic environment and oxidative condition (H_2O_2 for 24 h). Chromatographic resolution of more than 1.5 was achieved for NAB from unknown peaks.

Figure 2. Chromatograms obtained from (A) a non-spiked stainless steel and (B) the excipient mixture.



Linearity

Standard solutions were analyzed at six different concentration levels ranging from 0.1 to 4.56 µg/mL, with six determinations at each level. Linearity was observed when mean response area was plotted against concentration, using the least square and regression method

Table 1. Linear regression data in the analysis of NAB.

Statistical parameter	Values
Concentration range (µg/mL)	0.1–4.56
Regression equation	y=38782x+33512
Coefficient of determination	r^2=0.996
Residual standard deviation	9373.25

LOD and LOQ

There are several terms that have been used to define LOD and LOQ. In general, the LOD is taken as the lowest concentration of an analyte in a sample that can be detected, but not necessarily quantified, under the stated conditions of the test. The LOQ is the lowest concentration of an analyte in a sample that can be determined with acceptable precision and accuracy under the stated conditions of test.

Although reagent package inserts may state that an assay has a dynamic range that extends from zero concentration to some upper limit, typically an assay is simply not capable of accurately measuring analyte concentrations down to zero. Sufficient analyte concentration must be present to produce an analytical signal that can reliably be distinguished from "analytical noise," the signal produced in the absence of analyte

However, some common methods for the estimation of detection and quantitation limit are

- Visual definition
- Calculation from the signal-to-noise ratio (DL and QL correspond to 3 or 2 and 10 times the noise level, respectively)
- Calculation from the standard deviation of the blank
- Calculation from the calibration line at low concentrations

$$DL/QL = \frac{F \times SD}{b}$$

Where

F: Factor of 3.3 and 10 for DL and QL, respectively

SD: Standard deviation of the blank, standard deviation of the ordinate intercept, or residual standard deviation of the linear regression

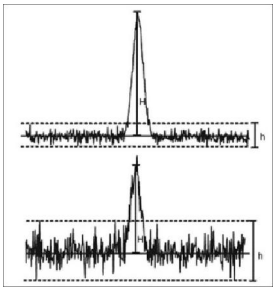
b: Slope of the regression line

The estimated limits should be verified by analyzing a suitable number of samples containing the analyte at the corresponding concentrations. The DL or QL and the procedure used for determination, as well as relevant chromatograms, should be reported.

Signal- to-noise

By using the signal-to-noise method, the peak-to-peak noise around the analyte retention time is measured, and subsequently, the concentration of the analyte that would yield a signal equal to certain value of noise to signal ratio is estimated. The noise magnitude can be measured either manually on the chromatogram printout or by auto-integrator of the instrument. A signal-to-noise ratio (S/N) of three is generally accepted for estimating LOD and signal-to-noise ratio of ten is used for estimating LOQ. This method is commonly applied to analytical methods that exhibit baseline noise.

For chromatography a test sample with the analyte at the level at which detection is required or determined is chromatographed over a period of time equivalent to 20 times the peak width at half-height . The signal-to-noise ratio is calculated from the Equation



$$S/D = \frac{2H}{h}$$

where H is the height of the peak, corresponding to the component concerned, in the chromatogram obtained with the prescribed reference solution, and measured from the maximum of the peak to the extrapolated baseline of the signal observed over a distance equal to 20 times the width at half-height h is the peak-to-peak background noise in a chromatogram obtained after injection or application of a blank, observed over a distance equal to 20 times the width at half-height of the peak in the chromatogram obtained.

This approach is specified in the European Pharmacopoeia. It is important that the system is

free from significant baseline drift and/or shifts during this determination.

Shows examples of S/N ratios of 10:1 and 3:1 which approximate the requirements for the QL and DL, respectively. This approach works only for peak height measurements.

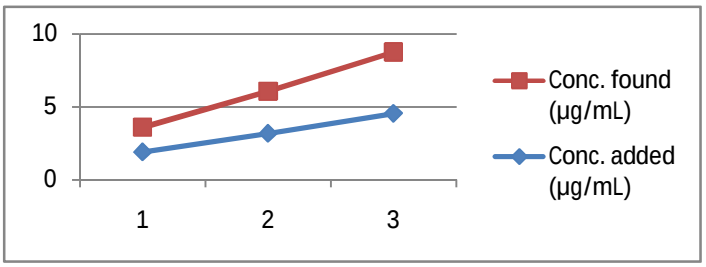
The LOD and LOQ were determined on the basis of standard deviation of the response (*y*-intercept) and the slope of the calibration curve at low concentration levels according to ICH guidelines . The LOD and LOQ for NAB were found to be 0.05 and 0.16 µg/mL, respectively.

Precision and accuracy

Recovery is the percentage of residual material that is actually removed by the sampling technique. Concentration of the analyte was compared with that of the spiked sample at three different concentration levels, 6 replicates each (1.91, 3.18 and 4.56 µg/mL). Observations are reported as relative standard deviation (RSD) and the recovery (%). Observations demonstrate appropriateness of the method for the purpose of residue monitoring.

Table 2. Precision and accuracy of the results obtained from swabbed plates spiked with NAB.

Conc. added (µg/mL)	Conc. found (µg/mL)	95% confidence interval (%)	%Recovery (RSD, *n*=6)
1.91	1.69	88.26–91.54	90.88±0.81
3.18	2.89	90.47–92.84	91.42±1.40
4.56	4.21	90.54–92.89	92.21±0.63



Six consecutive injections of standard solutions on two different days by different analysts and different reagents were performed to evaluate the inter-mediate precision of the method and expressed as the RSD. The RSD was found to be 2.24% and 3.88% for the first and second days, respectively. The observations indicate acceptable inter-mediate precision for NAB solution.

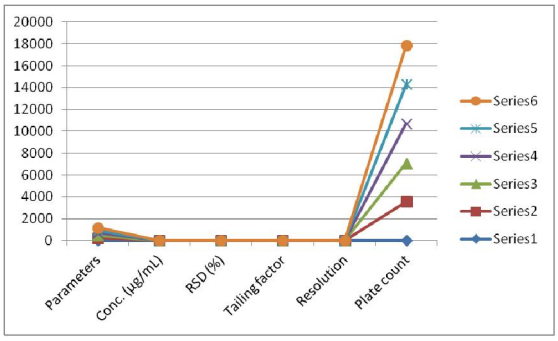
Robustness

Robustness of the HPLC-DAD method was demonstrated by evaluation of the effect of different chromatographic parameters on the resolution and the concentration of NAB sample. The flow rate was varied from 0.5 mL/min to 1.5 mL/min. The concentration of methanol in the mobile was varied from 52% to 58% and response was recorded at 230±4 nm. Significant differences were not observed in chromatographic parameters.

Table 3. Effect of different chromatographic parameters over method performance.

No.	Parameters	Conc. (µg/mL)	RSD (%)	Tailing factor	Resolution	Plate count
1.	Wavelength (nm)					
	230	0.832	0.69	1.18	2.56	3532
	232	0.835	0.14	1.20	2.44	3545
	234	0.832	0.11	1.20	2.56	3624
	236	0.832	0.83	1.18	2.45	3580
	238	0.834	1.05	1.20	2.56	3573
2.	Mobile phase composition					
	52:33:15	0.831	1.12	1.18	2.11	3360
	53:32:15	0.834	0.34	1.23	2.46	3450
	54:30:16	0.832	0.63	1.22	2.52	3521
	56:30:14	0.832	0.92	1.18	2.52	3312
	57:28:15	0.836	0.45	1.22	2.48	3543
3.	Flow rate (mL/min)					
	0.8	0.832	0.54	1.20	2.50	3455
	0.9	0.837	0.66	1.20	2.56	3461
	1.0	0.834	0.32	1.20	2.50	3578
	1.1	0.823	0.92	1.18	2.32	3343
	1.2	0.827	1.32	1.18	2.21	3211

Mobile phase composition shown as methanol:acetonitrile:water, v/v/v.



Sample and standard stability

The stabilities of NAB in the swab matrix and NAB standard solution were tested by storing them at ambient temperature for 24 h. They were injected after 6 h, 12 h and 24 h against fresh standard solutions. The stabilities of the standard NAB solution (4.8 µg/mL) and sample solutions after 24 h showed 2.16% difference in results. The stability of NAB in swab matrix showed 2.87% difference in results. Chromatography of both the samples showed no additional peaks

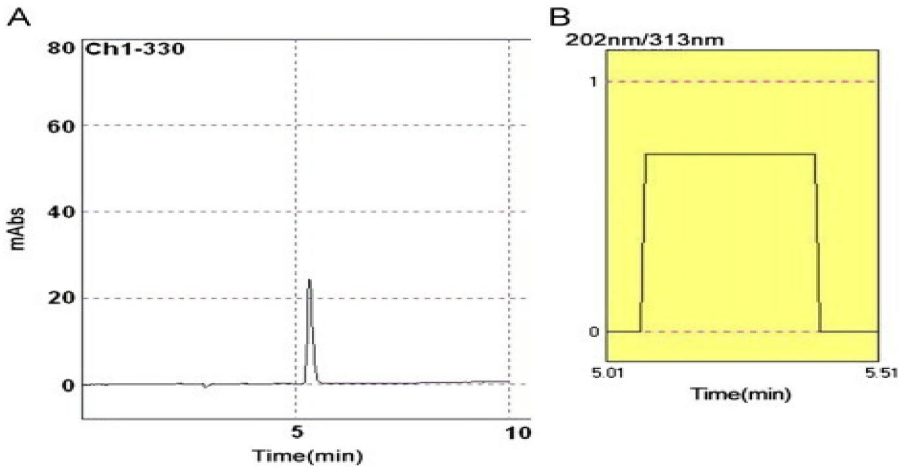


Figure 3. Chromatograms obtained from (A) Nabumetone standard solution, 2 µg/mL, and (B) ratio chromatogram of Nabumetone standard solution.

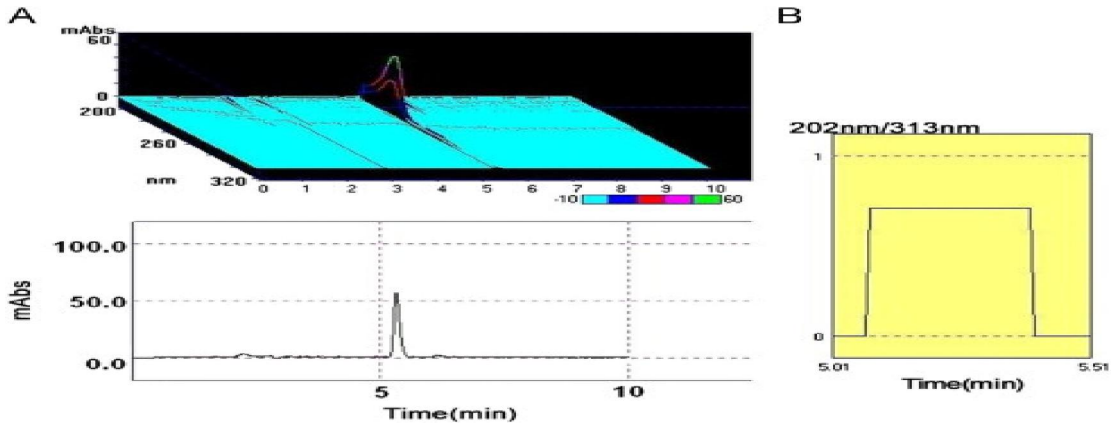


Figure 4. Chromatograms obtained from (A) Nabumetone sample solution, 5 µg/mL, with 3-dimension chromatogram and (B) ratio chromatogram of Nabumetone sample solution.

Filter evaluation

Samples and standard solutions of NAB were filtered with Millipore millex — HV-PVDF 0.45 µm and millex — PTFE-0.45 µm, and compared with unfiltered samples. The Millipore millex — HV-PVDF 0.45 µm and millex — PTFE-0.45 µm pore size syringe filters were qualified for use with filter evaluation ratio 100.28% and 100.36% for NAB standard solution with PVDF and PTFE filters, respectively. For samples, the filter evaluation ratio was 100.28% and 101.13% for PVDF and PTFE filters, respectively.

Estimation of NAB in swab samples collected from production lane

Various samples were collected from different sampling points over the production lane. Samples were tested for residual content of NAB. Partial data are shown in Table

Table 4. Estimation of NAB in actual swab samples (100 cm^2 swabbed area) from different sampling points on production lane.

No.	Sampling point	Residual conc. (µg/mL)
1.	Upper hopper	BDL
2.	Lower hopper	BDL
3.	Die	0.332
4.	Punch	0.362
5.	Lid gasket	0.324

QUALITY CONTROL SUGGESTIONS

For tapelift:

1. Use clear tape, not frosted.
2. Do not fold tape onto itself.
3. Stick tape on the inside of the plastic bag only.
4. Please do not send tape lift samples on slides or cover slips . They may arrive broken making the sample difficult to analyze.

For bulks:

1. Send a representative sample of the specimen if large. This prevents over-handling of the specimen and possible contamination. If analysis of a specific portion of sample is required, please note area(s) or take a tape lift of area.

For swab:

1. For semi-quantitative sampling, the area swabbed needs to be entered on the chain of custody.

For all matrices:

Apply tape, apply swab, or take a small piece of material only from areas where visible mold is seen.

Conclusion

A validated, can be done in selective and simple HPLC-DAD method which was developed for residual determination of NAB to demonstrate the cleaning validation on stainless steel surfaces which related to the production lane. The method which contains the appropriate swab wipe procedure was found to be precise, accurate and linear. There is no any interference from swab solution was observed and samples were stable for 24 hr.

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India Post - A Question of Survival

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Introduction:

Till the Post in India largely acted as a carrier of written communication between individuals and had the role of establishing a network in unopened and inaccessible areas, it had a public service role and character. During the last decade, not only has the share of the Post in the communication market declined, but also more significantly the share of private communication between individuals in the postal traffic has declined with the growing share of business-to-business, business-to-individual and individual-to-business communication. The Post in India is therefore acquiring a business character and has to face competition. The time is ripe to remove the governmental controls on the Post and vest it with operational and financial flexibility of a corporation.

Postal services were rendered by a combined Department of Posts and Telegraph till January 1985. The department as a whole was conceived and operated as a public utility like the railways and electricity. The Post and Telegraph was a part of the general budget of the central government. Due to slow induction of technology and old staff norms, manpower costs increased exponentially. Corresponding adjustment of product and service pricing lagged behind expenditure in a soft state, which perceived postal services as the common man' s means of communication and, therefore, needed to be under-priced with the state picking up the subsidy tag. The subsidy was a cross subsidy from the Telegraph in a combined Post and Telegraph Department but gradually the burden of cross subsidisation depleted the resources of the Telegraph Wing, which required massive capital for its expansion. Pressure from the Telegraph Wing and multinational financial institutions, which became lenders to the expansion of the Telegraph Wing, led to the complete separation of postal services from the telecommunications services in 1985. Since then, the liability for postal subsidy is being borne by the general exchequer.

Issues in Indian Postal system

Postal administration in India is grappling with the challenge posed by growing volume of mail, need to deliver services faster to the customers, increasing competition form private courier industry, administered prices and poor technology. These issues are discussed in detail below:

a) **Structural Issues**

Historically the post in India largely acted as a carrier of written communication between individuals and had the role of establishing a network in unopened and inaccessible areas, it had a public service role and character. During the last decade, not only has the share of the Post in the communication market declined, but also more

significantly the share of private communication between individuals in the postal traffic has declined with the growing share of business-to-business, business-to-individual and individual-to-business communication. The Post in India is therefore acquiring a business character and has to face competition. The time is ripe to remove the governmental controls on the Post and vest it with operational and financial flexibility of a corporation. The so-called social service character - the need to continue with a cheap postal service with state subsidy for the benefit of the common man, of the Post can be still retained in terms of well-defined universal service obligations.

b) **Technological Issues**

The department of Post continues to own and operate a large number of ancillary logistic services even though outsourcing these would be a cheaper alternative. Physical transmission of written message is getting outdated because of new means of electronic mail. The future of the department depends upon its ability to adopt new technology. Technology is the survival kit and competitive edge of any modern organisation. It has totally changed the way business is conducted especially in the communication sector. Physical exchange of data and message is fast being replaced by electronic exchange through the worldwide web. The constraints of physical transportation by surface or air are fast disappearing which has the tremendous potential of relieving an end-service provider like the Department of Posts of its reliance on physical carriers like railways and airlines. The Post has to choose to become an e-mail operator instead of a snail-mail operator if it has to survive competition.

India post is the largest and most credible outreach infrastructure in the country. It has several decades of experience in delivering bank accounts and payments across the country and especially to the poor. India Post is already in the process of reinvesting itself and has implemented several innovative products for its letter and package delivery business. However, while India post has also introduced new financial products, its own basic banking and money order products have remained unchanged for several decades.

Problems faced by India Post

There is no doubt of the fact that Indian post is playing a very important role in financial inclusion but it can play a much better role if it can overcome from the following problems:

- Lack of basic infrastructure: The post offices in India, especially post offices in rural areas which playing an important role in providing financial services in rural areas are not equipped with basic infrastructure. In most of the post offices even proper sitting arrangement for staff is not available.
- Less numbers of staff: There is a crunch of manpower in the post offices. It is observed that most of the post offices are run by one or two persons and need to do all sorts of work which has a very adverse effect on performance and output.
- Lack of coordination: There are many examples in the foreign countries where post offices are doing tremendous work for financial inclusion in coordination with other departments. But, till today Indian post keep itself away from other sister

organization or other organization also not seeking coordination of Indian post in providing financial services.

- § Slow progress of innovation: To cope with the fast changing environment Indian post also need to be catching the new invention and technology timely. The Indian post still following the age old practices of working, though it bringing some innovation recently but in a very slow speed. Out of total post offices only 25464 post offices are computerized till 2011-12.
- § Abstain from landing: Providing loan is one of the major aspects of financial inclusion but Indian post is not till today taking it as a part of its business which has narrowed down its operation.

Despite having these problems it has some other difficulties too in expanding its area of operation. From the verbal discussion with the officials it is observed that being a government department they cannot take a decision independently.

Challenges before India Post

India Post's recent initiatives, which include slotting itself in cyberspace through the ePost Office, are pointers to the manner in which the world's largest postal network can be better leveraged to strengthen the financial and communication infrastructure. The Internet and other affordable alternatives have hit the basic function of post offices: delivering letters and other mails. In India, as an answer to a question raised in the Lok Sabha reveals, the volume of mail traffic fell from 6,677.18 million pieces in 2006-07 to 6,391.15 million in 2007-08, and rose marginally to 6,540.90 million in 2008-09. That the figure for 1997-98 was 15,749.30 million points to the severity of the fall. Internationally too, there are clear signs of the Internet eating into postal systems. Developed economies, in particular, saw postal businesses slump further with the onset of the recession. Statistics provided by the Universal Postal Union (UPU) show that between 2008 and 2009 domestic mail volumes were down 12 per cent globally (translating to about 13 billion pieces). Although there are signs of recovery now, particularly in the parcel and express segments, fundamental challenges posed by the emergence of alternatives to the post remain.

India's expansion of telephone services — the number of telephone subscribers increased from 76.54 million in 2004 to 764.77 million in November 2010 — and the growth of broadband are important developments that could further eat into the letter-post. Against this backdrop, the ePost Office, through which customers can carry out some basic services such as Money Order transactions, marks the beginning of what could be a new chapter for India Post. Its agreement with the Unique Identification Authority of India (UIDAI) to work more closely in socio-economic areas with the provider of unique identity ID cards will be watched with interest round the world. An excellent way of strengthening India Post's finances would be to build on its biggest strength — as the world's largest postal network whose reach extends to all households in the country — and take a range of services closer to Indian residents: financial services and insurance products, for a start. Optimism over economic growth offers India Post an opportunity to correct its deficit-ridden balance sheets and also play a larger role in development by

strengthening business-to-business and business-to-consumer segments. Making this change — while maintaining its key public service role as a provider of affordable services for a country of a billion-plus people — is the strategic challenge facing India Post.

The Postal Service in India must return to its roots – of serving the people with a variety of services that they need and at costs which they can afford. It is a sad commentary on the management that it has yet to find a way to reach five thousand rupees as inexpensively across India as someone with a bank account can transfer a couple of lakhs of rupees almost instantaneously to another account across the country for less than Rs.50. It is high time the Post Office is run on a PPP model with a lot more empathy for our less well off citizens and with a lot more public oversight than the ineffective formal ones we have in place.

Reviving Technology for Better Services

Department of Posts caters to the public through Departmental and Gramin Dak Sevaks managed Post Offices. There are 154688 post offices in the country, out of which 25154 are departmental post offices and 129416 Gramin Dak Sevaks (GDS) managed post offices which are predominantly in the rural areas. Around 89.8 percent of post offices are located in rural areas, rest are in urban areas. Till the month of March 2012, 24969 departmental post offices had been computerised, out of these 19890 have been provided with network connectivity.

The software solutions deployed at the Post Offices include:

- Meghdoot for postal operations
- Sanchay Post for saving bank function
- Postal Life Insurance software for PLI work

Meghdoot and Sanchay Post are in Local Area Network (LAN), while the Postal Life Insurance software operates in the Wide Area Network (WAN) software.

Electronic money transfer

The money remittances done through Post Offices by electronic means are:-

- **iMO:** iMO is an instant web based money transfer service through Post Offices (iMO Centres) in India. You can transfer sums ranging between INR 1,000 to INR 50,000 from designated iMO Post Offices. The payee has to collect the payment from the Post Office Counter.
- **eMO:** eMOs are transmitted electronically from the Post Office of Booking to the Post Office of delivery and the payment is made at the doorsteps of the payee. Therefore, the transmission time involved in manual MO is reduced considerably. The maximum limit of money remittance is Rs. 5000/-.
- **Collaboration with Western Union andMoneygram:** Remittances from abroad can be received instantaneously and the payment is made at the Post Office counter on production of security code and authorised identity proof. Remittances of up to Rs. 50,000/- is payable in cash.
- **Remittances to other countries through Eurogiro (MO Videsh):** Money Order Videsh, a new offering of India Post,

facilitates remittances to foreign countries and receiving of remittances from foreign countries through the medium of Post Office. The service was launched in 2009.

Modernisation plans

The LAN based software limits the reach of the Post Offices and therefore, the department has taken up the implementation of IT Modernisation Project in 2012 under Plan scheme for which an outlay of RS.1877.2 crore has been made by the Government.

The project has the following components:-

- § It will establish IT infrastructure of Data Centre and Disaster Recovery Centre and networking of all Post offices including Grameen Dak Sewaks (GDS) managed Post Offices in rural areas.
- § The project envisages development of integrated modular scalable applications for mail, banking, postal life insurance, advanced financial services and ERP solutions for accounts and HR operations of the Department.
- § The GDS managed Post Offices will be provided with rural ICT devices with required applications for performing postal, banking, insurance, retail operations.
- § Provision for training, change management, capacity building of the employees of the department along with setting up of the Project Management Units at Department, Circle, Region and Division levels for smooth and timely implementation of the project.

With such a large network the question invariably is whether such a large network is beneficial to the common man or not. If the postal system enables to ensure optimal utilization of its infrastructure then it can be said that the network justifies itself, but if the utilization is low then there is a case for having a re-look at the existing infrastructure particularly in the rural sector. An analysis of the various policy initiatives undertaken during the past five year plans would reveal that the postal planning was based on a number of assumptions which have not fulfilled expectations as there is a difference between the market demand and our policy assumptions as the following table will show:

1. Whenever a post office is established, it contributes to the development of the area.
2. If any post office is set up then over a period of time its traffic increases till the post office becomes a profit-earning center.
3. If the State Governments are asked to contribute to the cost of the post office, then the part of the cost will be recovered.
4. As rural post offices are opened, the cost per post office is minimal and remains static over a period of time.
5. Post office has a Universal Service Obligation(USO) and therefore, the Govt. is duty bound to open post offices wherever they are required.
6. As number of post offices increase economies of scale starts working to the advantage of the post office.
7. There are over 6 lakh villages and it is important to provide cheap and efficient service to all the villages.

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