

---

## **Enterprise Productivity – An Employee Perspective**

---

### **3.1 Introduction**

The operational definition of Enterprise Productivity in the context of the study is given in section 2.2 as “the increase in user satisfaction, process improvement, better management, cost control, knowledge enhancement, collaboration and innovation brought about by adoption of Enterprise Resource Planning (ERP) software in the enterprise”. The various dimensions of the definition have as its basis the opinions of the ERP users to analyze Enterprise Productivity in an organization due to the adoption of ERP. As such, it becomes necessary to collect information from the end users of the ERP software.

Data was collected online from the ERP users in the refineries of Assam using the online Google App, Google Docs. It was selected as it offers numerous

advantages in collecting the data online. The methodology for the data collection has been specified in section 2.6.

### **3.2 Background of the Respondents**

Assessing the employees' perspective on Enterprise Productivity requires an understanding of their background through the demographic data. It can help in the determination of whether the individuals in the study are a representative sample of the target population which in turn gives better credibility to the study and the conclusions made. Demographic variables are independent variables by definition because they cannot be manipulated (Salkind, 2010). The demographic variables that have been considered in this section are gender (male / female), age (in years), job experience (in months), employee grade (executive / non-executive), the type of department they belonged (technical / non-technical) and reporting employees (yes / no). This gives us an understanding of the context in which the responses may be taken into consideration.

The population for the study consists of all employees of the four refineries who have SAP login ids. The total population for the study is 1210. The survey was done online by sending the online link of the questionnaire to the email ids of all the respondents. As only 239 responses were obtained, the study was done on these 239 respondents. This constitutes the sample size for the study. In absolute as well as in percentage terms, maximum respondents are from Digboi Refinery and minimum are from Bongaigaon Refinery (Table 2.4). The contents of this

section will give a detailed account of the respondents in terms of the demographic variables as already mentioned.

**Table 3.1: Employee Grades of the Respondents**

<b>Employee Grade</b>	<b>Bongaigaon Refinery</b>	<b>Digboi Refinery</b>	<b>Guwahati Refinery</b>	<b>Numaligarh Refinery</b>	<b>Total</b>
G	1	3	0	2	6
F	2	6	3	3	14
E	8	4	2	4	18
D	5	5	8	16	34
C	16	5	4	5	30
B	9	12	17	17	55
A	8	17	8	8	41
IX	1	6	2	NE <sup>1</sup>	9
VIII	1	13	6	NA <sup>2</sup>	20
VII	0	9	0	NA	9
V	0	1	0	NA	1
IV	0	0	2	NA	2
<b>Total</b>	<b>51</b>	<b>81</b>	<b>52</b>	<b>55</b>	<b>239</b>

*Data Source: Concerned Refineries*

Table 3.1 shows the employee grades of the respondents. In the refineries belonging to Indian Oil Corporation Limited (IOCL), there are two groups of

<sup>1</sup> In Numaligarh Refinery, this grade is non-existent

<sup>2</sup> In Numaligarh Refinery, the employees of these grades are not given SAP user ids

employees – Workmen and Officers<sup>3</sup>. Grades of Workmen are between I – IX while Officers are graded between AO, A – I. In Numaligarh Refinery Limited (NRL), the employees are classified as Non-supervisory employees and Supervisory employees. Non-supervisory employees have grades between I – VIII while supervisory employees have grades between 02, A – H (NRL, 2014). The grades of Officers in case of IOCL and Supervisory employees in case of NRL are equivalent as in evident from the pay scales. For e.g., pay scale of AO (in case of IOCL) and 02 (in case of NRL) is the same Rs. 20600-46500/-. But in case of the Workmen and Non-supervisory employees with respect to IOCL and NRL, the grades are not equivalent.

The term Executives have been used in place of Officers / Supervisory employees while the term Non-Executives have been used in place of Workmen / Non-supervisory employees for the sake of uniformity and simplicity. The fact that Non-supervisory employees in NRL are not given SAP licences negates the fact that grades in the Non-Executives category are not equivalent for IOCL and NRL.

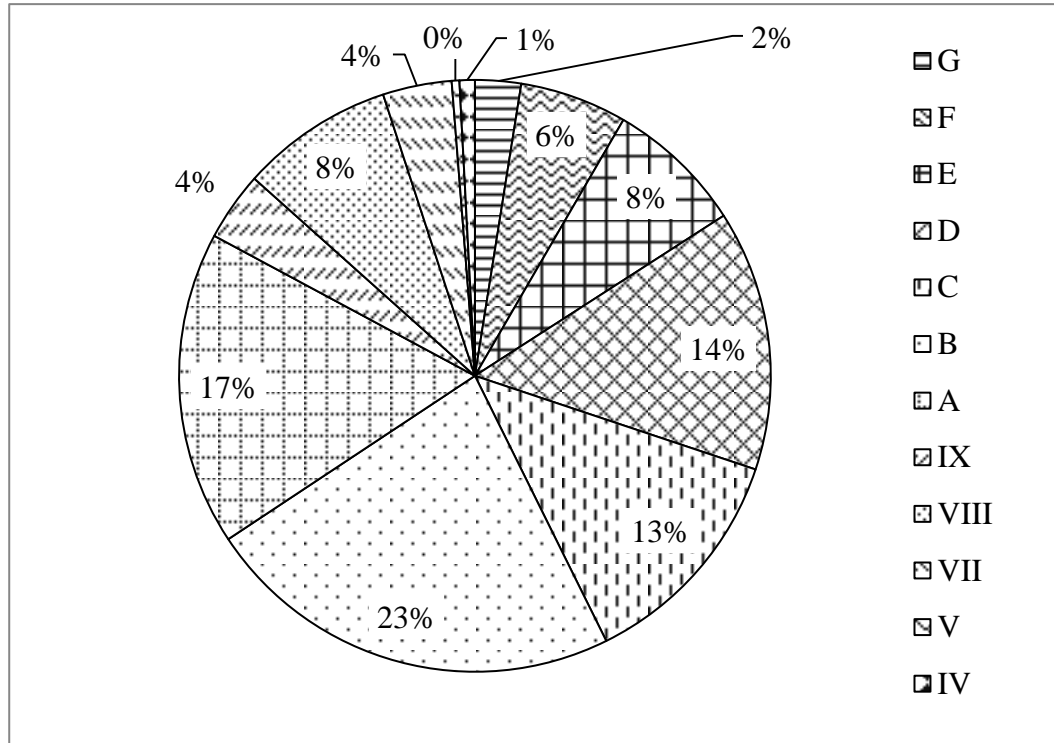
It is seen that 67 percent of the respondents belong to the grades A – D. As per the Information Manual of IOCL, as on 31.03.2015, around 73 percent of the Officers of IOCL belong to the grades A – D while as per NRL Annual Report of 2014 – 2015 also, around 73 percent of the Supervisory employees belong to the

---

<sup>3</sup><https://www.iocl.com/talktous/rtiiocmanual.aspx>

grades A – D. Thus, the sample is highly representative as far as the employee grade is concerned.

**Illustration 3.1: Employee Grades of Respondents (Overall in percentage)**



The classification of the respondents into Executives and Non-Executives is presented in Table 3.2 which is important for analysis later on. It is seen that 83 percent of the respondents in the sample are executives. All the respondents in Numaligarh Refinery are executives as non-executives are not given SAP login ids out there.

**Table 3.2: Grade wise Classification of the Respondents**

Name of the Refinery	Executives	Non-Executives	Total
Bongaigaon Refinery	49	2	51
Digboi Refinery	52	29	81
Guwahati Refinery	42	10	52
Numaligarh Refinery	55	0	55
<b>Total</b>	<b>198</b>	<b>41</b>	<b>239</b>

*Data Source: Concerned Refineries*

**Illustration 3.2: Grade wise Classification of the Respondents  
(in percentage)**

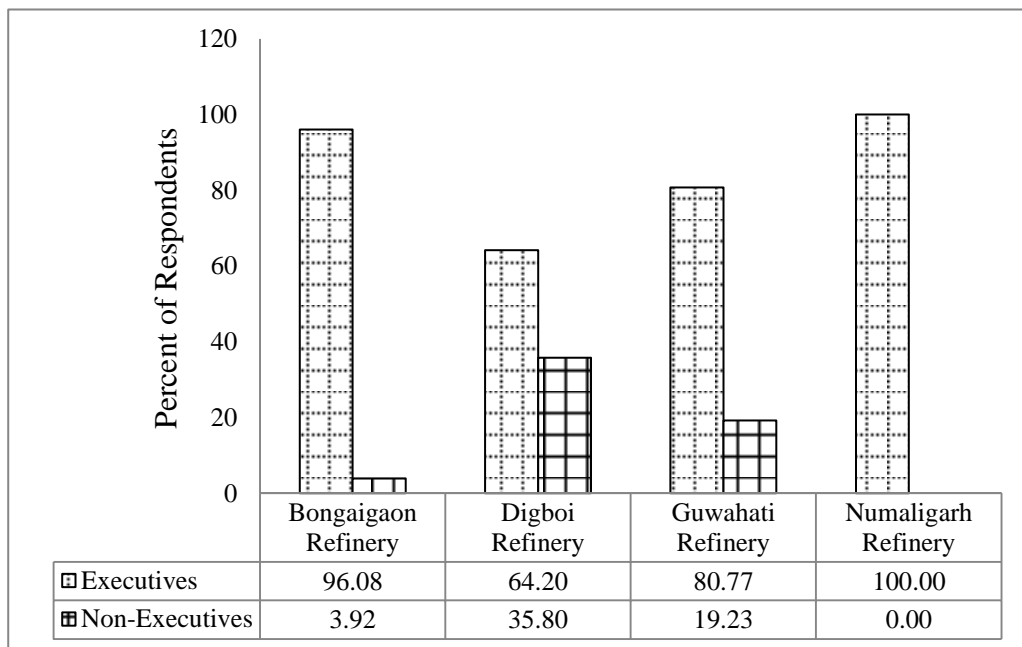


Table 3.3 gives an idea about the departments to which the respondents belong. It is seen that a sizeable number of departments are covered. There are respondents from all the major departments like Finance / Finance & Accounts, Human Resource, Information Systems / Integrated Information Systems, Internal Audit, Materials / Materials & Contract, Production, Quality Control and Technical Services. There are respondents also from most of the departments concerned with maintenance activities. Numaligarh Refinery has more number of departments as they handle the production as well as the marketing functions. The percentage of departments covered range from a high of 80 for Guwahati Refinery to a low of 57 for Numaligarh Refinery. For Bongaigaon Refinery and Digboi Refinery, the percentages of departments covered are 59 and 67 respectively.

**Table 3.3: Departments Covered by the Respondents**

<b>Name of the Refinery</b>	<b>Total Number of Departments</b>	<b>Number of Departments to which Respondents Belong</b>
Bongaigaon Refinery	22	13
Digboi Refinery	21	14
Guwahati Refinery	20	16
Numaligarh Refinery	35	20

*Data Source: Concerned Refineries*

**Table 3.4: Classification of Departments of the Respondents**

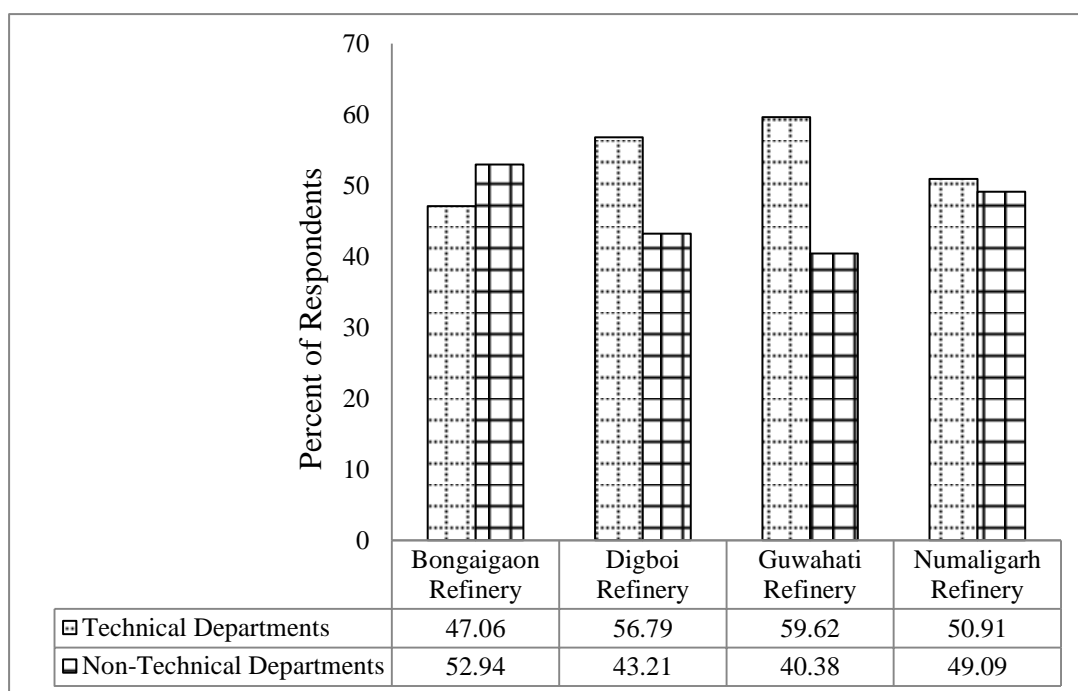
<b>Name of the Refinery</b>	<b>Technical Departments</b>	<b>Non-Technical Departments</b>	<b>Total</b>
Bongaigaon Refinery	24	27	51
Digboi Refinery	46	35	81
Guwahati Refinery	31	21	52
Numaligarh Refinery	28	27	55
<b>Total</b>	<b>126</b>	<b>113</b>	<b>239</b>

*Data Source: Concerned Refineries*

For the population of 1210, 703 employees belong to the technical departments which constitute around 58 percent of the population and 507 employees belong to the non-technical departments which constitute 42 percent of the population (Appendix 2). For the sample, it is seen that respondents belonging to the non-technical departments are more than that of the technical departments. Still the percentage difference is not too large between the population and the sample. Thus, the sample is fairly representative as far as the department type is concerned. The classification of the respondents keeping in mind the department type is used for analysis later on.



**Illustration 3.3: Classification of Departments of the Respondents  
(in percentage)**



**Table 3.5: Age of Respondents (in completed years)**

Name of the Refinery	Maximum Age	Minimum Age	Mid-Point	Average Age	Median Age
Bongaigaon Refinery	59	24	41.5	46.4	51
Digboi Refinery	59	23	41.0	44.3	47
Guwahati Refinery	59	23	41.0	38.1	37
Numaligarh Refinery	56	26	41.0	38.5	39

*Data Source: Concerned Refineries*

Table 3.5 gives an idea about the age of the respondents. The age of the respondents vary between 23 years and 59 years. For a Public Sector Undertaking (PSU) in India, the retirement age is 60. The average age of the respondents suggest that Guwahati Refinery has the youngest set of respondents while Bongaigaon Refinery has the oldest. In case of Bongaigaon and Digboi refineries, the employees have average ages that are less than the median ages; it means that more employees are older than the average age as reported. The reverse is true in the case of the other two refineries.

**Table 3.6: Age Groups of Respondents (in years)**

<b>Name of the Refinery</b>	<b>22 – 34</b>	<b>35 – 47</b>	<b>48 – 60</b>	<b>Total</b>
Bongaigaon Refinery	12	10	29	51
Digboi Refinery	16	13	52	81
Guwahati Refinery	26	12	14	52
Numaligarh Refinery	17	31	7	55
<b>Total</b>	<b>71</b>	<b>66</b>	<b>102</b>	<b>239</b>

*Data Source: Concerned Refineries*

The age group data as reported in Table 3.6 will be used for analysis later on. The three age groups correspond to the Young (22 – 34), Middle Age (35 – 47) and Senior (48 – 60) groups respectively. The groups have been formed by looking at the maximum and minimum age of the respondents. Age data is not available for the population under study.

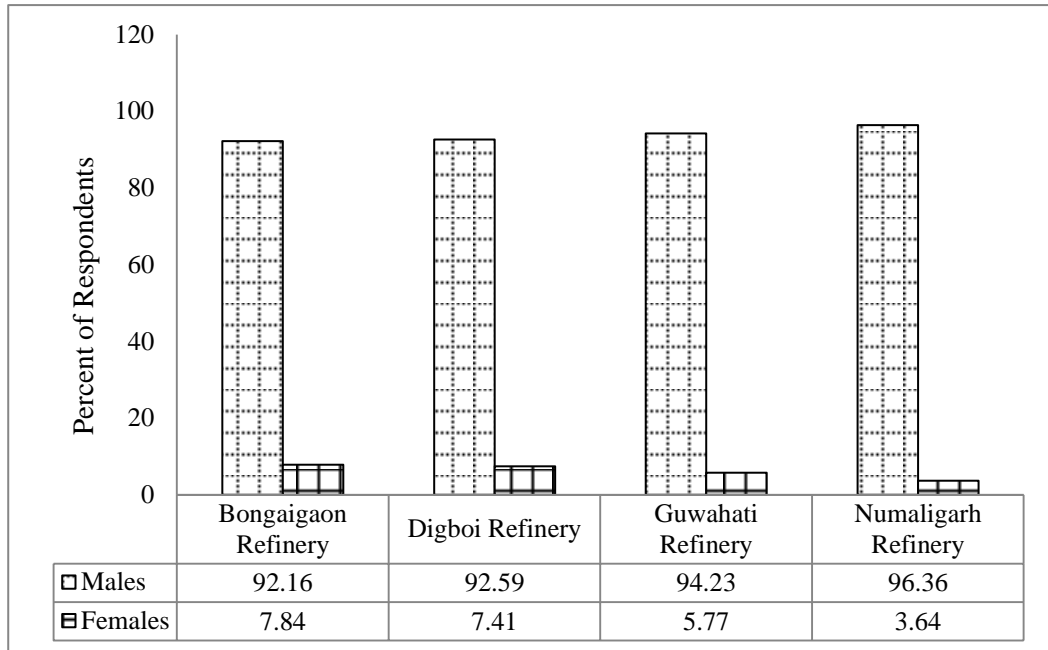
Form Table 3.7, we see that the males outnumber the females by a factor of more than 15:1 in the sample that is being studied. Out of the total respondents, only around 6 percent of the respondents are females. As on March 31, 2014, the number of females in the IOC workforce was 7.82 percent (Director’s Report presented at the AGM held on July 17, 2014). In case of NRL, as on March 31, 2013, the female workforce comprised only 5.1 percent of the total workforce (Sustainable Development Report, 2012 – 2013, Numaligarh Refinery Limited). Thus, we may say that the sample has adequate representation of females with respect to the population.

**Table 3.7: Gender wise Classification of the Respondents**

<b>Name of the Refinery</b>	<b>Males</b>	<b>Females</b>	<b>Total</b>
Bongaigaon Refinery	47	4	51
Digboi Refinery	75	6	81
Guwahati Refinery	49	3	52
Numaligarh Refinery	53	2	55
<b>Total</b>	<b>224</b>	<b>15</b>	<b>239</b>

*Data Source: Concerned Refineries*

**Illustration 3.4: Gender wise Classification of the Respondents  
(in percentage)**



**Table 3.8: Experience of Respondents (in months)**

Name of the Refinery	Maximum Experience	Minimum Experience	Mid-Point	Average Experience	Median Experience
Bongaigaon Refinery	456	3	229.5	266	312
Digboi Refinery	360	2	179.0	166	132
Guwahati Refinery	428	1	214.5	128	64
Numaligarh Refinery	370	4	187.0	103	77

*Data Source: Concerned Refineries*

The respondents have varied experiences as illustrated in Table 3.8. Bongaigaon Refinery has employees with relatively more experience as the average experience shows. Experience data is not available for the population under study.

**Table 3.9 Experience Groups of Respondents (in months)**

<b>Name of the Refinery</b>	<b>0 – 99</b>	<b>100 – 199</b>	<b>200 – 299</b>	<b>300 – 399</b>	<b>400 – 499</b>	<b>Total</b>
Bongaigaon Refinery	12	3	8	17	11	51
Digboi Refinery	38	11	9	19	4	81
Guwahati Refinery	31	3	12	5	1	52
Numaligarh Refinery	34	10	8	3	0	55
<b>Total</b>	<b>115</b>	<b>27</b>	<b>37</b>	<b>44</b>	<b>16</b>	<b>239</b>

*Data Source: Concerned Refineries*

The Experience Group data as reported in Table 3.9 is used for analysis later on. The five experience groups correspond to the Novice (0 – 99), Somewhat Experienced (100 – 199), Experienced (200 – 299), Very Experienced (300 – 399) and Expert (400 – 499) groups respectively. The groups have been formed by looking at the maximum and minimum experience of the respondents and forming equal class intervals. Nearly half of the respondents (48.12 percent) in the sample belong to the Novice experience group only. It can be understood that

---

many employees join the refineries at a comparatively later age because most respondents belong to the senior age group of 48 – 60 years but when it comes to experience, maximum respondents belong to the novice experience group of 0 – 99 months (0 – 8 years 3 months).

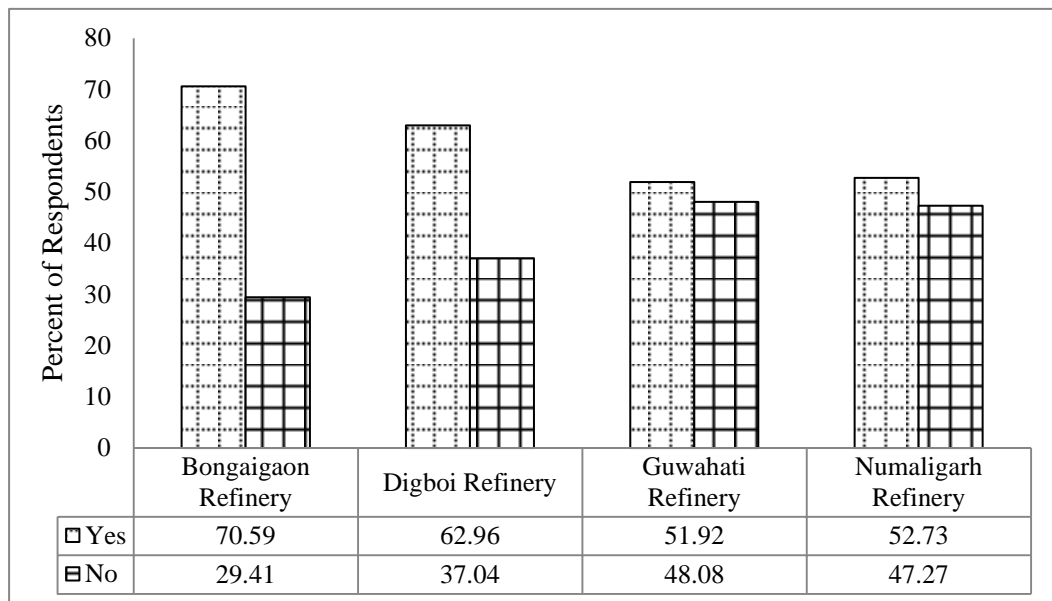
**Table 3.10: Respondents having Reporting Employees**

Name of the Refinery	Yes	No	Total
Bongaigaon Refinery	36	15	51
Digboi Refinery	51	30	81
Guwahati Refinery	27	25	52
Numaligarh Refinery	29	26	55
<b>Total</b>	<b>143</b>	<b>96</b>	<b>239</b>

*Data Source: Concerned Refineries*

Table 3.10 shows the number of respondents who have employees reporting to them. 59.83 percent of the respondents in the sample have employees reporting to them. In the case of individual refineries, the percentages of the respondents having reporting employees are shown in Illustration 3.5. The highest value is for Bongaigaon Refinery and the lowest is for Guwahati Refinery. This data is used for analysis later on.

**Illustration 3.5: Respondents Having Reporting Employees (in percentage)**



### 3.3 Idea on Enterprise Productivity

This section looks at Enterprise Productivity from the perspective of the ERP (SAP) users of the Refineries. An attempt is made to find out as to whether the ERP users have come across the term, Enterprise Productivity and what the term means to them. This information is juxtaposed on the data on training programmes on productivity and the demographic variables already mentioned in the previous section.

**Table 3.11: Respondents who have attended Training Programmes on Productivity**

<b>Name of the Refinery</b>	<b>Yes</b>	<b>No</b>	<b>Total</b>
Bongaigaon Refinery	37	14	51
Digboi Refinery	47	34	81
Guwahati Refinery	28	24	52
Numaligarh Refinery	20	35	55
<b>Total</b>	<b>132</b>	<b>107</b>	<b>239</b>

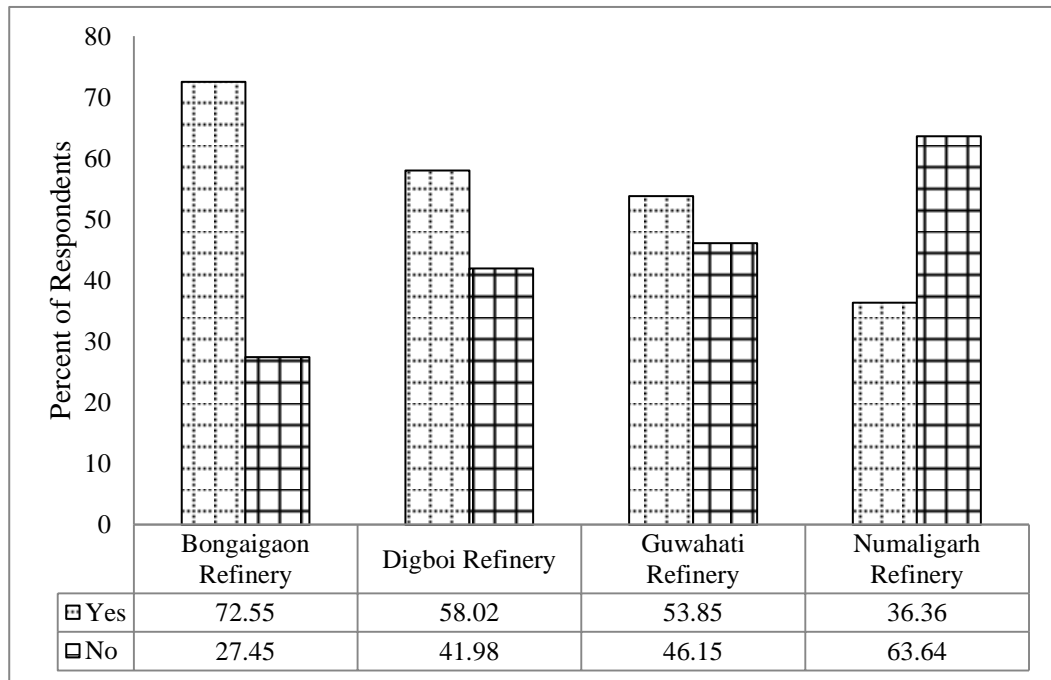
*Data Source: Concerned Refineries*

Table 3.11 shows that for the total sample, a very high percentage (44.77 percent) of the respondents have not attended training programmes on productivity. If the data on the individual refineries is seen, the situation is the worst in Numaligarh Refinery where 63.64 percent of the respondents have not attended any training programmes on productivity while Bongaigaon Refinery is the best where only 27.45 percent of the respondents have not attended any training programmes on productivity. Bongaigaon Refinery and Digboi Refinery, both have an exclusive department called TPM (Total Productive Maintenance). This might be a factor behind the fact that more respondents in these two refineries have attended training programmes on productivity. TPM is a globally accepted concept by industries for improving productivity through improved methods and related practices. One of the main objectives of TPM is to increase the productivity of plants and equipments with a modest investment in maintenance, which is achieved through the participation and cooperation of the workers. Training on productivity and related issues is thus a core activity under TPM.

---



**Illustration 3.6: Respondents who have attended Training Programmes on Productivity (in percentage)**



**Table 3.12: Number of Training Programmes Attended by the Respondents on Productivity**

Name of the Refinery	No. of Training Programmes							Total
	1	2	3	4	5	>5		
Bongaigaon Refinery	16	16	3	2	0	0	37	
Digboi Refinery	24	12	5	3	1	2	47	
Guwahati Refinery	10	12	4	1	0	1	28	
Numaligarh Refinery	9	7	1	0	3	0	20	
<b>Total</b>	<b>59</b>	<b>47</b>	<b>13</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>132</b>	

*Data Source: Concerned Refineries*

Table 3.12 indicates that maximum number of respondents in the sample who have attended training programmes on productivity have attended only one training programme. In percentage terms, this is 44.70 percent. Table 3.13 derived from Table 3.12 shows the information on the number of respondents who have attended multiple training programmes on productivity. It is observed that 55.30 percent of the respondents have attended multiple training programmes on productivity. This information is used to do further analysis.

**Table 3.13: Multiple Training Programmes Attended on Productivity**

<b>Name of the Refinery</b>	<b>Yes</b>	<b>No</b>	<b>Total</b>
Bongaigaon Refinery	21	16	37
Digboi Refinery	23	24	47
Guwahati Refinery	18	10	28
Numaligarh Refinery	11	9	20
<b>Total</b>	<b>73</b>	<b>59</b>	<b>132</b>

*Data Source: Concerned Refineries*

**Table 3.14: Respondents Knowing about Enterprise Productivity**

<b>Name of the Refinery</b>	<b>Yes</b>	<b>No</b>	<b>Total</b>
Bongaigaon Refinery	30	21	51
Digboi Refinery	43	38	81
Guwahati Refinery	34	18	52
Numaligarh Refinery	33	22	55
<b>Total</b>	<b>140</b>	<b>99</b>	<b>239</b>

*Data Source: Concerned Refineries*

**Illustration 3.7: Respondents Knowing about Enterprise Productivity (in percentage)**

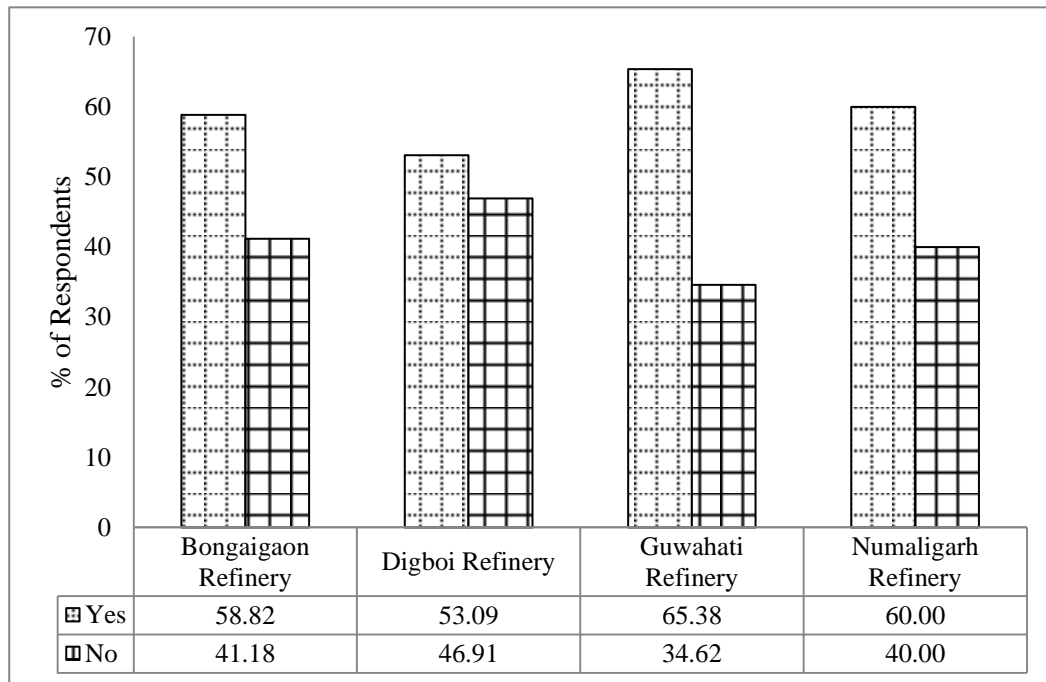


Table 3.14 reveals that a fairly high percentage (41.42 percent) of the respondents in the sample does not know about the term Enterprise Productivity. The situation is the worst in Digboi Refinery with 46.91 percent of the respondents ignorant of the term while Guwahati Refinery is the best with 34.62 percent of the respondents not knowing about the term.

The co-relation coefficient  $r$  between “Training Programmes on Productivity Attended (TPPA)” and “Knowing about Enterprise Productivity (KEP)” is 0.63. TPPA gives the number of respondents who have attended training programmes on productivity and KEP gives the number of respondents who know about Enterprise Productivity for each of the refineries giving us a data set on TPPA

and KEP. Labeling systems exist to roughly categorize  $r$  values, where correlation coefficients (in absolute value) which are  $\leq 0.35$  are generally considered to represent low or weak correlations, 0.36 to 0.67 modest or moderate correlations, and 0.68 to 1.0 strong or high correlations and with  $r$  coefficients  $\geq 0.90$  as very high correlations (Taylor, 1990). Thus, we may say that there is a moderate relationship or association between TPPA and KEP. This can be viewed as a situation which states that employees who have attended training programmes on productivity are more likely to know about Enterprise Productivity.

To have more insights on the relationship between TPPA and KEP, a response matrix is constructed. Since TPPA and KEP responses are of type Yes/No, four combinations of responses are possible. Yes / Yes, No / No, Yes / No and No / Yes.

**Table 3.15: Response Matrix (TPPA & KEP) for all the Refineries**

<b>TPPA Response</b>	<b>KEP Response</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	Yes	92	38.49
No	No	60	25.10
Yes	No	39	16.32
No	Yes	48	20.08
<b>Total</b>		<b>239</b>	<b>100</b>

*Data Source: Concerned Refineries*

Table 3.15 shows the response matrix for all the respondents of the four refineries taken together. It is seen that 25.10 percent of the respondents have neither attended training programmes on productivity nor have they knowledge about enterprise productivity. This shows that this section of respondents might have had knowledge about enterprise productivity had they attended training programmes on productivity. It is also seen that 16.32 percent of the respondents have attended training programmes on productivity but have no knowledge about Enterprise Productivity. This paints a picture wherein the training has been unsuccessful in orienting the respondents towards new terminologies. Interestingly, 20.08 percent of the respondents have knowledge about Enterprise Productivity in spite of not having attended any training programmes on productivity which reflects that a significant number of employees do keep track of the latest terminologies that are being used.

**Table 3.16: Response Matrix (TPPA & KEP) for Bongaigaon Refinery**

TPPA Response	KEP Response	Frequency	Percentage
Yes	Yes	24	47.06
No	No	7	13.73
Yes	No	13	25.49
No	Yes	7	13.73
<b>Total</b>		<b>51</b>	<b>100</b>

*Data Source: Bongaigaon Refinery*

**Table 3.17: Response Matrix (TPPA & KEP) for Digboi Refinery**

TPPA Response	KEP Response	Frequency	Percentage
Yes	Yes	31	38.27
No	No	24	29.63
Yes	No	15	18.52
No	Yes	11	13.58
<b>Total</b>		<b>81</b>	<b>100</b>

*Data Source: Digboi Refinery*

**Table 3.18: Response Matrix (TPPA & KEP) for Guwahati Refinery**

TPPA Response	KEP Response	Frequency	Percentage
Yes	Yes	19	36.54
No	No	9	17.31
Yes	No	9	17.31
No	Yes	15	28.85
<b>Total</b>		<b>52</b>	<b>100</b>

*Data Source: Guwahati Refinery*

**Table 3.19: Response Matrix (TPPA & KEP) for Numaligarh Refinery**

TPPA Response	KEP Response	Frequency	Percentage
Yes	Yes	18	32.73
No	No	20	36.36
Yes	No	2	3.64
No	Yes	15	27.27
<b>Total</b>		<b>55</b>	<b>100</b>

*Data Source: Numaligarh Refinery*

A look at the response matrix for the individual refineries (Table 3.16 to Table 3.19) throws interesting insights. It is seen that the No / Yes combination, i.e., respondents who have not attended any training programmes on productivity yet know about enterprise productivity are markedly high in cases of Guwahati Refinery and Numaligarh Refinery in comparison to Bongaigaon Refinery and Digboi Refinery. And Table 3.5 had shown that both Guwahati and Numaligarh refineries have a comparatively younger work force. It may be that young employees are more abreast of latest developments and thus even without formal awareness and training, are more likely to know about the latest developments in a field.

It can be checked if there is some kind of relationship between Multiple Training Programmes Attended on Productivity (MTPAP) and KEP. The variables MTPAP and KEP are of truly dichotomous type. We find the phi coefficient ( $\Phi$ ) to find the association between them.

Researchers often use the phi coefficient if at least one of the variables in a particular contingency table is nominal and both variables are dichotomous, thus producing a 2 by 2 table. Attributes such as living or dead, black or white, accept or reject and success or failure are examples of this type. It may assume any value between -1 and 1. The sign of the phi-coefficient does not have any particular meaning. The closer the magnitude of phi is to 1, the greater is the relationship between the variables. Phi is a symmetrical statistic, which means that its value

does not depend on which variable is the independent variable and which variable is the dependent variable.

The phi-coefficient relates to the  $2 \times 2$  table.

Attribute 1	Attribute 2	
	Yes	No
Yes	a	b
No	c	d

If a, b, c, and d represent the frequencies of observation, then  $\Phi$  is determined by the relationship:

$$\Phi = \frac{ad - bc}{\sqrt{(a + b)(c + d)(a + c)(b + d)}}$$

The value of  $\Phi^2$  (the square of the  $\Phi$ ) measures the proportion of one variable that is explained by the other variable.

**Table 3.20:  $\Phi$  and  $\Phi^2$  between MTPAP & KEP**

Name of the Refinery	$\Phi$	$\Phi^2$
Bongaigaon Refinery	-0.1853	0.0343
Digboi Refinery	-0.2428	0.0590
Guwahati Refinery	0.2850	0.0812
Numaligarh Refinery	0.0335	0.0001
<b>Overall</b>	<b>-0.0812</b>	<b>0.0066</b>

*Data Source: Concerned Refineries*



Table 3.20 shows that  $\Phi$  and  $\Phi^2$  values are insignificant for the individual refineries as well as for the entire sample. This indicates that multiple training programmes have not had much of an effect on awareness about Enterprise Productivity.

The variables, gender, Department Types of Respondents (DTR), Employee Types of Respondents (ETR), Having Reporting Employees (HRE) and KEP are also of truly dichotomous type.  $\Phi$  and  $\Phi^2$  are found out as explained earlier to find the association between KEP and the other variables as specified.

**Table 3.21:  $\Phi$  and  $\Phi^2$  between Gender & KEP**

Name of the Refinery	$\Phi$	$\Phi^2$
Bongaigaon Refinery	-0.0959	0.0092
Digboi Refinery	0.2036	0.0415
Guwahati Refinery	0.1667	0.0278
Numaligarh Refinery	0.0397	0.0016
<b>Overall</b>	<b>0.0626</b>	<b>0.0039</b>

*Data Source: Concerned Refineries*

$\Phi$  and  $\Phi^2$  values (Table 3.21) for all the refineries individually and taken together shows that gender has not much of an effect on KEP.

**Table 3.22:  $\Phi$  and  $\Phi^2$  between DTR & KEP**

Name of the Refinery	$\Phi$	$\Phi^2$
Bongaigaon Refinery	-0.4085	0.1669
Digboi Refinery	-0.1208	0.0146
Guwahati Refinery	-0.0222	0.0005
Numaligarh Refinery	-0.0594	0.0035
<b>Overall</b>	<b>-0.1460</b>	<b>0.0213</b>

*Data Source: Concerned Refineries*

**Table 3.23:  $\Phi$  and  $\Phi^2$  between ETR & KEP**

Name of the Refinery	$\Phi$	$\Phi^2$
Bongaigaon Refinery	0.1690	0.0286
Digboi Refinery	0.0312	0.0010
Guwahati Refinery	0.1499	0.0225
Numaligarh Refinery	NA <sup>4</sup>	NA
<b>Overall</b>	<b>-0.0447</b>	<b>0.0020</b>

*Data Source: Concerned Refineries*

The  $\Phi$  and  $\Phi^2$  (Table 3.22 – Table 3.24) values show that the type of Department (Technical / Non-Technical) or the type of Employee (Executive / Non-Executive) or whether the respondent have Reporting Employees (Yes / No) does not have much of an effect on KEP. This is true for the overall sample as well as the individual refineries except one minor aberration.

<sup>4</sup> In Numaligarh Refinery, no employees in the Non-Executive Cadre are given SAP User id

**Table 3.24:  $\Phi$  and  $\Phi^2$  between HRE & KEP**

Name of the Refinery	$\Phi$	$\Phi^2$
Bongaigaon Refinery	0.2469	0.0610
Digboi Refinery	-0.1063	0.0113
Guwahati Refinery	-0.0529	0.0028
Numaligarh Refinery	0.0446	0.0020
<b>Overall</b>	<b>0.0041</b>	<b>0.0000</b>

*Data Source: Concerned Refineries*

In case of Bongaigaon Refinery, 16.69 percent of the variance in KEP is explained by the respondent belonging to a Technical / Non-Technical department. This is significant with respect to all other values and is a key finding.

### **3.4 Respondents Understanding of Enterprise Productivity**

To know the respondents understanding of Enterprise Productivity, they were asked to give their most preferred definition of Enterprise Productivity among the following:

- Efficiency & Working Smarter (EWS)
- Good Service & Satisfaction (GSS)
- Increasing Profits (IP)
- Reducing Wastes (RW)
- Lowering Costs (LC)
- Meeting Targets (MT)

- Improving Market Share (IMS)

**Table 3.25: Respondents answer to the question “What is Enterprise Productivity?”**

<b>Name of the Refinery</b>	<b>EWS</b>	<b>GSS</b>	<b>IP</b>	<b>RW</b>	<b>LC</b>	<b>MT</b>	<b>IMS</b>
Bongaigaon Refinery	41	30	30	25	24	23	14
Digboi Refinery	50	35	22	29	27	14	13
Guwahati Refinery	36	27	23	22	20	13	14
Numaligarh Refinery	43	23	18	25	27	18	8
<b>Total</b>	<b>170</b>	<b>115</b>	<b>93</b>	<b>101</b>	<b>98</b>	<b>68</b>	<b>49</b>

*Data Source: Concerned Refineries*

Table 3.25 clearly indicates that “Efficiency and Working Smarter (EWS)” is the most accepted definition of Enterprise Productivity from the point of the view of the ERP users with 71.13 percent agreeing with that. “Good Service and Satisfaction” is a distant second with only 48.12 percent of the respondents agreeing to it. The least preferred definition is “Improving Market Share” with only 20.50 percent of the ERP users making a mention about it.

It is interesting to note that in all the refineries of Assam, “Efficiency and Working Smarter” takes the pole position. It is a decisive and clear winner. In

Bongaigaon Refinery, it is 80.39 percent, in Digboi Refinery, it is 61.73 percent, in Guwahati Refinery, it is 69.23 percent and in Numaligarh Refinery, it is 78.18 percent. The bottom line is that if there is efficiency and smart work, automatically there will be Enterprise Productivity. As far as the second most preferred definition of Enterprise Productivity is concerned, it is “Good Service and Satisfaction” except in Numaligarh Refinery where it is “Lowering Costs”.

Tables 3.26 – 3.30 looks at the preferred definition of Enterprise Productivity according to the age groups as defined earlier: Young (22 – 34), Middle (35 – 47) and Senior (48 – 60) for the individual refineries as well as taking all the refineries together.

**Table 3.26: Preferred Definition of Enterprise Productivity as per Age Group**

Age Group (in years)	EWS	GSS	IP	RW	LC	MT	IMS
22 – 34	52	26	27	37	26	21	18
35 – 47	61	35	29	35	39	23	14
48 – 60	57	54	37	29	33	24	17
<b>Total</b>	<b>170</b>	<b>115</b>	<b>93</b>	<b>101</b>	<b>98</b>	<b>68</b>	<b>49</b>

*Data Source: Concerned Refineries*

Across age groups also, taking all the refineries taken together, “Efficiency and Working Smarter” is the most accepted definition of Enterprise Productivity with 73.24 percent of young, 92.42 percent of middle age and 55.88 percent of senior respondents agreeing with it (Table 3.26). “Reducing Wastes” is the second

choice for the young respondents with 52.11 percent, “Lowering Costs” for the middle age with 59.09 percent and “Good Service and Satisfaction” for the senior with 52.94 percent of the respondents opting for it. Thus across age groups, there is competition for the second spot. The fact that the young respondents have ranked “Reducing Wastes” in the second slot means that they are more aware about productivity being attained through reduction of wastes. The least preferred definition across the different age groups of ERP users continues to be “Improving Market Share”.

Tables 3.27 – 3.30 shows that across the refineries and across age groups, there is some inconsistency in the most preferred definition for Enterprise Productivity. There is indication from the data that in the case of individual refineries across the different age groups, “Efficiency & Working Smarter” is not the most dominant as far as the most preferred definition of Enterprise Productivity is concerned.

**Table 3.27: Preferred Definition of Enterprise Productivity as per Age Group at Bongaigaon Refinery**

Age Group (in years)	EWS	GSS	IP	RW	LC	MT	IMS
22 – 34	10	5	8	7	4	4	5
35 – 47	10	5	4	5	5	4	2
48 – 60	21	20	18	13	15	15	7
<b>Total</b>	<b>41</b>	<b>30</b>	<b>30</b>	<b>25</b>	<b>24</b>	<b>23</b>	<b>14</b>

*Data Source: Bongaigaon Refinery*

**Table 3.28: Preferred Definition of Enterprise Productivity as per Age Group at Digboi Refinery**

Age Group (in years)	EWS	GSS	IP	RW	LC	MT	IMS
22 – 34	11	3	5	11	7	3	4
35 – 47	18	11	6	8	11	6	3
48 – 60	21	21	11	10	9	5	6
<b>Total</b>	<b>50</b>	<b>35</b>	<b>22</b>	<b>29</b>	<b>27</b>	<b>14</b>	<b>13</b>

*Data Source: Digboi Refinery*

**Table 3.29: Preferred Definition of Enterprise Productivity as per Age Group at Guwahati Refinery**

Age Group (in years)	EWS	GSS	IP	RW	LC	MT	IMS
22 – 34	18	12	11	14	8	8	8
35 – 47	7	7	6	5	6	3	4
48 – 60	11	8	6	3	6	2	2
<b>Total</b>	<b>36</b>	<b>27</b>	<b>23</b>	<b>22</b>	<b>20</b>	<b>13</b>	<b>14</b>

*Data Source: Guwahati Refinery*

In case of Numaligarh Refinery (Table 3.30), the most preferred definition of Enterprise Productivity for the senior age group is “Good Service & Satisfaction”. In fact, for this age group, this definition runs close to “Efficiency & Working Smarter” in all the other refineries. The reason behind “Good Service & Satisfaction” being preferred by the senior age group might be the fact that for them, there is a perceived reduction in their efficiency levels which they try to

compensate by better service. Still “Efficiency & Working Smarter” is in the top two slots for all the refineries and across all the age groups.

**Table 3.30: Preferred Definition of Enterprise Productivity as per Age Group at Numaligarh Refinery**

Age Group (in years)	EWS	GSS	IP	RW	LC	MT	IMS
22 – 34	13	6	3	5	7	6	1
35 – 47	26	12	13	17	17	10	5
48 – 60	4	5	2	3	3	2	2
<b>Total</b>	<b>43</b>	<b>23</b>	<b>18</b>	<b>25</b>	<b>27</b>	<b>18</b>	<b>8</b>

*Data Source: Numaligarh Refinery*

**Table 3.31: Preferred Definition of Enterprise Productivity as per Experience Group**

Experience Group (in months)	EWS	GSS	IP	RW	LC	MT	IMS
0 – 99	86	42	43	50	40	32	29
100 – 199	19	13	10	15	15	10	5
200 – 299	26	26	13	16	18	6	3
300 – 399	29	23	18	13	16	11	8
400 – 499	10	11	9	7	9	9	4
<b>Total</b>	<b>170</b>	<b>115</b>	<b>93</b>	<b>101</b>	<b>98</b>	<b>68</b>	<b>49</b>

*Data Source: Concerned Refineries*



Tables 3.31 – 3.35 looks at the preferred definition of Enterprise Productivity according to the experience groups as defined earlier: Novice (0 – 99), Somewhat Experienced (100 – 199), Experienced (200 – 299), Very Experienced (300 – 399), and Expert (400 – 499) for the individual refineries as well as taking all the refineries together.

As seen in Table 3.31, across experience groups for all the refineries taken together, “Efficiency and Working Smarter” is the most accepted definition of Enterprise Productivity except in the experience group 400 – 499, i.e., the Expert Experience Group where “Good Service & Satisfaction” triumphs. This is somewhat in line with what the senior age group felt about Enterprise Productivity as the respondents in the senior age group will also have the maximum experience. Also, in the Experienced Experience Group, there is a tie between “Efficiency and Working Smarter” and “Good Service & Satisfaction” for the number one position. As far as the second most accepted definition is concerned, there are variations in the outcome. In the Novice Experience Group, it is “Reducing Wastes”; in the Somewhat Experienced Experience Group, there is a tie between “Reducing Wastes” and “Lowering Costs”; in the Experienced Experience Group, it is “Lowering Costs”; in the Very Experienced Experience Group, it is “Good Service & Satisfaction” and in the Expert Experienced Group, it is “Efficiency and Working Smarter”. “Improving Market Share” in case of experience groups also finds the minimum favour as far as using it to define Enterprise Productivity is concerned.

**Table 3.32: Preferred Definition of Enterprise Productivity as per Experience Group at Bongaigaon Refinery**

Experience Group (in months)	EWS	GSS	IP	RW	LC	MT	IMS
0 – 99	10	3	6	5	3	2	4
100 – 199	3	3	3	3	2	3	2
200 – 299	8	5	4	4	4	4	1
300 – 399	12	11	9	7	8	6	4
400 – 499	8	8	8	6	7	8	3
<b>Total</b>	<b>41</b>	<b>30</b>	<b>30</b>	<b>25</b>	<b>24</b>	<b>23</b>	<b>14</b>

*Data Source: Bongaigaon Refinery*

**Table 3.33: Preferred Definition of Enterprise Productivity as per Experience Group at Digboi Refinery**

Experience Group (in months)	EWS	GSS	IP	RW	LC	MT	IMS
0 – 99	29	15	14	19	14	9	11
100 – 199	6	2	2	4	4	2	0
200 – 299	3	7	0	1	2	0	0
300 – 399	10	9	5	4	5	2	1
400 – 499	2	2	1	1	2	1	1
<b>Total</b>	<b>50</b>	<b>35</b>	<b>22</b>	<b>29</b>	<b>27</b>	<b>14</b>	<b>13</b>

*Data Source: Digboi Refinery*

Tables 3.32 – 3.36 shows that across the refineries and across the different experience groups also, there is an absence of absolute unanimity in the most preferred definition for Enterprise Productivity. For e.g., at Numaligarh Refinery, for the Somewhat Experienced (100 – 199) Experience Group, the most preferred definition of Enterprise Productivity is “Lowering Costs”. For the same experience group in Bongaigoan Refinery, there is no clear winner for the most preferred definition of Enterprise Productivity. At Digboi Refinery, for the Experienced (200 – 299) Experience Group, “Good Service & Satisfaction” wins the race for the most preferred definition of Enterprise Productivity.

**Table 3.34: Preferred Definition of Enterprise Productivity as per Experience Group at Guwahati Refinery**

<b>Experience Group (in months)</b>	<b>EWS</b>	<b>GSS</b>	<b>IP</b>	<b>RW</b>	<b>LC</b>	<b>MT</b>	<b>IMS</b>
0 – 99	20	13	13	14	11	9	10
100 – 199	3	3	1	2	1	2	2
200 – 299	9	9	7	6	7	1	1
300 – 399	4	1	2	0	1	1	1
400 – 499	0	1	0	0	0	0	0
<b>Total</b>	<b>36</b>	<b>27</b>	<b>23</b>	<b>22</b>	<b>20</b>	<b>13</b>	<b>14</b>

*Data Source: Guwahati Refinery*

**Table 3.35: Preferred Definition of Enterprise Productivity as per Experience Group at Numaligarh Refinery**

<b>Experience Group (in months)</b>	<b>EWS</b>	<b>GSS</b>	<b>IP</b>	<b>RW</b>	<b>LC</b>	<b>MT</b>	<b>IMS</b>
0 – 99	27	11	10	12	12	12	4
100 – 199	7	5	4	6	8	3	1
200 – 299	6	5	2	5	5	1	1
300 – 399	3	2	2	2	2	2	2
400 – 499	0	0	0	0	0	0	0
<b>Total</b>	<b>43</b>	<b>23</b>	<b>18</b>	<b>25</b>	<b>27</b>	<b>18</b>	<b>8</b>

*Data Source: Numaligarh Refinery*

At both Bongaigaon Refinery and Digboi Refinery, there is no clear winner for the Expert (400 – 499) Experience Group. At Guwahati Refinery, ties are seen for the experience groups – Somewhat Experienced (100 – 199) and Experienced (200 – 299). But overall, “Efficiency and Working Smarter” does come out to be the most significant definition when we consider the different experience groups.

### **3.5 Conclusion**

This chapter looked at the first objective of the present study, “To understand the concept of Enterprise Productivity from the point of view of the Enterprise Resource Planning (ERP) users in the refineries of Assam”.

It is seen that first of all, a sizeable number of the sampled ERP users in the refineries of Assam (41.42 percent) have not got introduced to the term Enterprise Productivity. Also, 44.72 percent of the sampled ERP users have not attended training programmes on productivity. If the training programmes on productivity covers more ERP users, idea on Enterprise Productivity will improve. Awareness on productivity is crucial to improve Enterprise Productivity. The variables Gender, Department Types of Respondents (DTR), Employee Types of Respondents (ETR), Having Reporting Employees (HRE) have negligible influence on Knowledge about Enterprise Productivity (KEP).

The refineries should also see to it that those ERP users who are yet to receive any training on productivity are prioritized over those who have already received at least one training on productivity as far as arranging training programmes on productivity are concerned. This is because Multiple Training Programmes Attended on Productivity (MTPAP) has negligible influence on Knowledge about Enterprise Productivity (KEP).

The study shows that the most acceptable definition of Enterprise Productivity amongst the sampled ERP users in the refineries of Assam is “Efficiency and Working Smarter”. This definition is also accepted to a large extent across age groups as well as experience groups for the overall sample as well as among the ERP users sampled in the individual refineries. It is thus concluded that from the point of view of the ERP users in the refineries of Assam, the concept of Enterprise Productivity hinges around “Efficiency and Working Smarter”. Other

---

definitions that see favour among the ERP users are “Good Service & Satisfaction”, “Increasing Profits”, “Reducing Wastes” and “Lowering Costs” in varied degrees.

“Meeting Targets” and “Improved Market Share” are consistently in the last two slots in the mind of the ERP users when talking about Enterprise Productivity. This is true in case of all the ERP users in the refineries of Assam taken together, the individual refineries as well as across age groups and experience groups of the ERP users.