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A STATISTICAL ANALYSIS OF NAVY BACHELOR
HOUSING USER REQUIREMENTS

David Arthur Ehemann

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THESIS

A STATISTICAL ANALYSIS OF NAVY BACHELOR
HOUSING USER REQUIREMENTS

by

David Arthur Ehemann

September 1974

Thesis Advisor:

G. K. Poock

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A Statistical Analysis of Navy Bachelor Housing
User Requirements

by

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Lieutenant, United States Navy
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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the

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September 1974

ABSTRACT

An analysis of previously collected data pertaining to critical areas of user satisfaction with government bachelor quarters was conducted to pin point critical areas for consideration in future housing design and construction. The data, collected from enlisted men and officers living both on and off base, was analyzed using both non-parametric comparative statistics (including correlation measures) and the parametric analyses of the variance. The survey which served as the data source was designed and administered as a previous thesis requirement.

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I. INTRODUCTION

In order to produce a favorable attitude among bachelor service personnel towards their living quarters, attention must be given to the varied requirements and needs of the individual user of the quarters provided. Future planning must include information obtained from the users themselves. Adapting the quarters to the occupant is much preferred to forcing the occupant to adapt to the quarters.

Designers must rely upon observation and analysis of behavior in the quarters, not upon intuitive design concepts evolved from practice or individual experience. Surveys, interviews, and personal contact with the users of living quarters are key steps in obtaining information about user requirements and attitudes toward the environment in which they live [Bowman, *et. al.*, 1973].

The above quotation summarizes the purpose of the study sponsored by the Naval Facilities Engineering Command (Project Order Number PO-3-0019) and carried out at the Man-Machine Systems Laboratory at the Naval Postgraduate School. The purpose of the project was to conduct research in the area of current user satisfaction and requirements of bachelor housing in an effort to determine critical areas of needed improvement. Data was obtained through the administration of questionnaires and through personal interviews at five West coast Naval installations [Bowman, *et. al.*, 1973].

It is the intention of this thesis to provide additional information about the previously collected data through the application of parametric and non-parametric statistical tests and to attempt to identify critical areas of user satisfaction, providing the Naval Facilities Engineering Command with a basis for continuing study in this area.

II. METHODOLOGY

The original data collected consisted of four groupings of service personnel [Bowman, *et. al.*, 1973]. In this analysis, the original data pertaining to the E-2 through E-4 female personnel was deleted due to the extremely small sample size. As a result, this study dealt only with E-2 through E-4 male personnel, E-5 through E-6 male personnel, and O-1 through O-3 male personnel. Each of these three groupings was further divided into those who resided on-base and those who resided off-base, so that a comparison of areas of importance and levels of satisfaction could be made.

No statistical tests were applied to the data pertaining to furnishings preference, personal storage requirements, building and room occupancy, leisure activities, general facilities, and areas of sociological concerns, since the questionnaire was structured in such a way that the summary statistics presented in the original analysis were sufficient for individuals to make any necessary inferences in these areas. Both parametric and non-parametric statistical tests were applied to those portions of the questionnaire which dealt with general satisfaction. For purposes of this analysis, the area of general satisfaction was subdivided into two areas.

The first area of general satisfaction dealt with the rankings of ten items in their order of importance to the

subjects, with the rank of one being most important. (Appendix A.) In the previous study this area was called preference; in this study, however, it will be called "importance". The second area called "satisfaction", required the subjects to indicate their degree of satisfaction on a five point scale, with rank one being very dissatisfied, for each of the ten items. (Appendix A.)

The initial portion of the analysis consisted of a one-way analysis of variance of importance and a one-way analysis of variance of satisfaction for each of the six groups. The assumptions associated with an analysis of variance are that the populations are normally distributed and of equal variances. This method is "fairly" robust and, therefore, relatively insensitive to violations of the assumption of normality, as well as, the assumption of equal variance [Hicks, 1973]. Any significant difference ($\alpha = .05$) was further tested by application of the Duncan Multiple Range Test in order to identify where differences occurred.

A two-way analysis of variance of importance and a two-way analysis of variance of satisfaction were conducted between on-base and off-base personnel in order to determine whether rankings between the groups were different. Further implications will be discussed in the presentation of results.

The intent of the original study was to measure, through a questionnaire, two independent variables, importance and satisfaction. The area of importance was designed to measure what items were considered most important to personnel,

while the area of satisfaction was to identify those items with which the personnel were least satisfied. As a result, Spearman's Rank Correlation Coefficient was employed to measure the degree of independence between the two categories. A lack of independence would suggest that not two but one variable was actually being measured.

Kendall's Coefficient of Concordance, W , was applied to measure the degree of agreement between subjects. A significant W may be interpreted as meaning the subjects applied essentially the same standards or criteria in ranking the ten items. It must be emphasized, however, that a significant W does not mean the criteria being used is correct [Siegel, 1956]. Furthermore, a significant coefficient of concordance yields an ordering of items by both importance and satisfaction. This non-parametric ordering could then be used to compare with the order derived from the Analysis of Variance and Duncan Multiple Range Test. A difference in ordering would imply the analysis of variance was not robust enough to yield meaningful information from the original data.

III. RESULTS AND DISCUSSION

A. E-2 THROUGH E-4 ON-BASE MALE PERSONNEL

This group originally consisted of 167 personnel; however, nine data points were deleted from the portion of the analysis dealing with importance and eight data points deleted from the portion dealing with satisfaction, leaving sample sizes of 159 and 158 subjects respectively. The reason for the deletions was that the subjects involved responded incorrectly to the format of the questionnaire and the insertion of their responses into the analysis may have contaminated the results.

1. Importance

Table I presents the summary statistics for the on-base order of importance. The ranking of the ten items was derived solely by the mean value of the response assigned to each item by the 159 subjects, with the lowest mean representing the most important item.

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	5.057	5.040	4
Fixtures	6.233	4.710	7
Personal Storage Space	4.792	6.317	3
Messing Facilities	5.384	6.362	5
Regulations/Policy	6.038	7.688	6
Building Maintenance	6.465	5.566	8
Building Location	7.145	5.758	9
Availability of Base Transportation	7.528	6.500	10
Personal/Individual Privacy	2.390	4.780	1
Safety/Security	3.906	8.477	2

*Lowest Rank represents most important.

Table I. Summary Statistics E-2 to E-4 On-Base Male Personnel Importance.

Table II presents the results of the one-way analysis of variance of importance data. It displays a significant difference between the items assigned rank. The difference is so significant, in fact, that the null hypothesis of no difference between the ranking of items can be rejected at the $\alpha = .0001$ level. The Duncan Multiple Range Test disclosed that personal/individual privacy and safety/security are statistically different from each other as well as from the remaining seven items in their order of importance. While there is no difference between personal storage space and furniture and no difference between furniture and messing facilities, there is a significant difference between personal storage space and messing facilities. The items ranked six through eight inclusive were statistically the same but differ from the other seven items. Building location and availability of base transportation, items ranked nine and ten respectively, were statistically the same but differ significantly from the items ranked one through eight.

Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in ranking the items in their order of importance.

2. Satisfaction

Table III presents the summary statistics for the on-base satisfaction level. The ranking of the ten items derived solely by the mean value of the response assigned to each item by the 159 subjects, with the lowest mean

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	3430.216	381.135	62.163*
Error	1580	9687.284	6.131	
Total	1589	13117.500		

*Significant level $\alpha = .05$

Table II. One-Way Analysis of Variance E-2 to E-4 On-Base Male Personnel Importance.

Duncan Multiple Range Test*

1	2	3	4	5	6	7	8	9	10
		<u> </u>	<u> </u>		<u> </u>	<u> </u>		<u> </u>	

*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .261^*$$

The ranking of items is identical to the parametric ranking.

*Significant level $\alpha = .05$

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	2.696	1.237	7
Fixtures	2.392	1.466	2
Personal Storage Space	2.614	1.604	5
Messing Facilities	2.658	1.402	6
Safety/Security	2.720	1.476	9
Regulations/Policy	2.605	1.182	4
Building Maintenance	2.462	1.249	3
Building Location	3.405	1.102	10
Availability of Base Transportation	2.709	1.535	8
Personal/Individual Privacy	2.133	1.368	1

*Lowest rank represents lowest satisfaction.

Table III. Summary Statistics E-2 to E-4 On-Base Male Personnel Satisfaction.

representing the lowest level of satisfaction. It should be noted, however, that the means listed in the table contain much more information than the items' ranking. The mean values disclose that the subjects were dissatisfied with items ranked one through nine with building location being the only item ranked as high as indifferent.

Table IV contains the results of the one-way analysis of variance of satisfaction and displays a significant difference between the items' assigned ranks. The Duncan Multiple Range Test discloses that personal/individual privacy stands out as being the most unsatisfactory of the ten items. There is no significant difference between the items ranked two through six, but there is a difference between fixtures (rank two) and furniture (rank seven). Items with ranks three through nine display no significant difference in level of satisfaction, but all other items as significantly less satisfactory than building location.

Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in assigning a satisfaction index to each of the ten items.

3. Importance and Satisfaction

Table V displays the results of Spearman's Rank Correlation Coefficient between satisfaction and importance. Of the ten categories, five show a significant correlation, implying there is dependence between the two variables being measured. The dependence further indicates that the questionnaire may not be measuring both satisfaction and importance but only one of the two.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	150.218	16.691	12.112*
Error	1570	2163.526	1.378	
Total	1579	2313.744		

*Significant level $\alpha = .05$.

Table IV. One-Way Analysis of Variance E-2 to E-4 On-Base Male Personnel Satisfaction.

Duncan Multiple Range Test*

1 2 3 4 5 6 7 8 9 10

*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .095^*$$

The ranking of items is identical to the parametric ranking.

*Significant level $\alpha = .05$

<u>Item</u>	<u>Rho</u>
Furniture	- .051
Fixtures	.236*
Personal Storage Space	.087
Messing Facilities	- .076
Regulations/Policy	.19 *
Building Maintenance	.178*
Building Location	.045
Availability of Base Transportation	.120
Personal/Individual Privacy	.260*
Safety/Security	.320*

*Significant Level $\alpha = .05$

Table V. Spearman Rank Correlation Coefficient Between Importance and Satisfaction E-2 to E-4 On-Base Male Personnel.

4. Summary

The results of Spearman's Rank Correlation Coefficient must be bore in mind when decisions are made pertaining to satisfaction and importance of the ten rated items. Since the dependency in five of the ten categories indicates that satisfaction and importance are one in the same to the subjects, the area of importance alone should be used in the decision-making process.

The analysis of importance yielded considerable information through the one-way analysis of variance, the Duncan Multiple Range Test and Kendall's Coefficient of Concordance. Not only is there a significant difference in the ordering of items, but a consistency in the criteria used by the subjects in their ranking as indicated by the significant concordance.

The analysis of satisfaction, however, shows that the subjects are dissatisfied with nine of the ten items. Furthermore, even though the one-way analysis of variance yielded significant results, the Duncan Multiple Range Test displayed a tight grouping of seven items with only personal/individual privacy, fixtures, and building location being different from each other and the remaining seven items.

In summary, it appears as though the satisfaction level of the personnel can be increased considerably by improving the areas the subjects consider to be most important. For the E-2 to E-4 on-base male personnel, initial improvements should be made in the areas of personal/

individual privacy, safety/security, personal storage space, furniture and messing facilities.

B. E-2 THROUGH E-4 OFF-BASE MALE PERSONNEL

The group consisted of a sample size of 51 personnel. Initial investigation of the data disclosed there were no errors made in following the format of the desired responses. As a result, all the original data was included in this portion of the analysis.

1. Importance

Table VI presents the summary statistics for the off-base order of importance. The ranking of the ten items was done initially by the mean value of the response assigned to each item by the 51 subjects, with the lowest mean representing the most important item. Two items, messing facilities and regulations/policy have identical means of 5.330; therefore, their order of rank was derived through the use of the variances. Since messing facilities had the smaller variance of the two, it was considered more important than regulations/policy and, therefore, given the lower rank. So far as the remainder of the analysis goes, the rank is ignored and the two items are considered to be of equal importance.

Table VII presents the results of the one-way analysis of variance of importance and displays a significant difference between the items' assigned rank. The Duncan Multiple Range Test discloses that personal/individual

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	4.820	6.025	4
Fixtures	6.078	4.914	7
Personal Storage Space	4.588	6.166	3
Messing Facilities	5.330	6.026	5
Regulations/Policy	5.330	8.426	6
Building Maintenance	6.470	5.093	8
Building Location	7.430	4.768	9
Availability of Base Transportation	7.686	6.697	10
Personal/Individual Privacy	2.686	5.739	1
Safety/Security	4.568	10.069	2

*Lowest rank represents most important

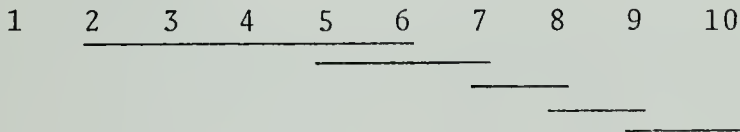
Table VI. Summary Statistics E-2 to E-4 Off-Base Male Personnel Importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	971.884	107.987	16.034*
Error	500	3367.334	6.735	
Total	509	4339.218		

*Significant level $\alpha = .05$

Table VII. One-Way Analysis of Variance E-2 to E-4 Off-Base Male Personnel Importance.

Duncan Multiple Range Test*



*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .231^*$$

The ranking of items is identical to the parametric ranking.

*Significant level $\alpha = .05$.

privacy is statistically different from the remaining nine items and is considered to be more important than the others. There is no significant difference in the perceived importance of the items ranked two through six. Although messing facilities and fixtures (items of rank five and seven respectively) are statistically the same, there is a significant difference between furniture and fixtures (items of rank four and seven respectively). Although items of rank seven and eight, eight and nine, and nine and ten are equal statistically, transitivity does not hold and causes fixtures to be different from building location, and building maintenance to be different from availability of base transportation.

Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in ranking the items in their order of importance.

2. Satisfaction

Table VIII presents the summary statistics for the off-base personnel satisfaction level. The ranking of the ten items was derived solely by the mean value of the response assigned to each item by the 51 subjects, with the lowest mean representing the lowest level of satisfaction. It should be noted, however, that the means listed in the table contain much more information than the items' ranking. In that the mean values disclosed the subjects were dissatisfied with items ranked one through nine with building location being the only item ranked as high as "indifferent".

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>	<u>Rank**</u>
Furniture	2.921	1.754	9	9
Fixtures	2.660	1.739	3	3
Personal Storage Space	2.569	1.770	2	2
Messing Facilities	2.740	1.502	5	8
Safety/Security	2.765	1.784	6	4
Regulations/Policy	2.706	1.732	4	5
Building Maintenance	2.840	1.770	8	6
Building Location	3.460	1.111	10	10
Availability of Base Transportation	2.820	1.579	7	7
Personal/Individual Privacy	2.480	2.377	1	1

*Lowest rank represents lowest satisfaction.

**Ranking yielded by Kendall's Coefficient of Concordance.
Lowest rank represents lowest satisfaction.

Table VIII. Summary Statistics E-2 to E-4 Off-Base Male Personnel Satisfaction.

Table IX contains the results of the one-way analysis of variance of satisfaction and displays the fact that there is no significant difference between the items' assigned ranks.

Kendall's Coefficient of Concordance disclosed that the subjects applied essentially the same standard in assigning a satisfaction index to each of the ten items. Further results of this test disclosed a difference in ranking from that derived solely through the ordering of means (Table VIII); therefore, a Friedman one-way analysis of variance was applied. Once again, however, the hypothesis of no difference in satisfaction level was accepted.

3. Importance and Satisfaction

Table X displays the results of Spearman's Rank Correlation Coefficient between satisfaction and importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	30.724	3.414	1.910
Error	500	893.568	1.787	
Total	509	924.292		

Table IX. One-Way Analysis of Variance E-2 to E-4 Off-Base Male Personnel Satisfaction.

Kendall's Coefficient of Concordance

$$W = .052^*$$

*Significant level $\alpha = .05$.

<u>Item</u>	<u>Rho</u>
Furniture	.134
Fixtures	.075
Personal Storage Space	.114
Messing Facilities	.286*
Regulations/Policy	.046
Building Maintenance	- .031
Building Location	- .357*
Availability of Base Transportation	- .024
Personal/Individual Privacy	.137
Safety/Security	.115

*Significant level $\alpha = .05$.

Table X. Spearman Rank Correlation Coefficient Between Importance and Satisfaction E-2 to E-4 Off-Base Male Personnel.

Of the ten categories, two show a significant correlation, implying there is a difference between the two variables being measured. It appears that, for the remaining items, it is reasonable to assume the subjects used different criteria in ranking the items in their order of importance and in assigning a value representing their level of satisfaction for each of the ten items.

4. Summary

Although Spearman's Rho disclosed a strong degree of independence between importance and satisfaction, and although the subjects were in agreement in assigning values to their level of satisfaction for the ten items, the results of the analysis which pertains to satisfaction is of little value as a decision-making tool. In fact, the only information to be gained from the investigation of satisfaction is that the personnel are dissatisfied with nine of the ten items.

The analysis of importance, on the other hand, yielded considerable information as revealed by the one-way analysis of variance, the Duncan Multiple Range Test and Kendall's Coefficient of Concordance. Not only was there a significant difference in the ordering of items, but a consistency in the criteria used by the subjects in their ranking, as indicated by the significant concordance.

The satisfaction level of the E-2 to E-4 off-base male personnel can be increased considerably by improving the areas the subjects consider to be most important. For this group, initial improvements desired are in the areas of personal/individual privacy, safety/security, personal storage space, furniture, messing facilities and regulations/policy.

C. E-2 THROUGH E-4 ON/OFF BASE MALE PERSONNEL

1. Importance

The results of the two-way analysis of variance of importance between the on-base and off-base personnel are displayed in Table XI. As illustrated, the difference between items is statistically significant, which suggests a perceived order of importance. The perceived order of importance by the two groups with respect to location is not significantly different. In fact, Table I and Table VI show that the ten items are identically ordered by the on-base and the off-base personnel. It should be noted that the interaction between items and location is not significant.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	4353.429	483.714	77.073*
Location	1	.216	.216	.034
I x L	9	48.671	5.408	.862
Error	2080	13054.618	6.276	
Total	2099	17456.934		

*Significant level $\alpha = .05$

Table XI. Two-Way Analysis of Variance E-2 to E-4 On/Off Base Male Personnel Importance of Items vs. Location.

2. Satisfaction

The results of the two-way analysis of variance of satisfaction between the on-base and off-base personnel are displayed in Table XII. As illustrated, there is a statistically significant difference between the levels of satisfaction of the ten ranked items. The significance of the F statistic related to location reveals a difference in

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	175.026	19.447	13.166*
Location	1	6.187	6.187	4.189*
I x L	9	5.915	.657	.445
Error	2070	3057.095	1.477	
Total	2089	3244.223		

*Significant level $\alpha = .05$.

Table XII. Two-Way Analysis of Variance E-2 to E-4 On/Off Base Male Personnel Satisfaction of Items vs. Location.

satisfaction level between those personnel who reside on-base and those who reside off-base. There is not, however, a significant interaction between items and location.

3. Summary

Analysis of the off-base order of importance and level of satisfaction for the ten items can yield valuable insight for improving on-base housing. It can be assumed that these personnel who chose to live off-base selected a residence which yielded the most personal satisfaction within their budget constraints. As a result of this assumption, a two-way analysis of variance of importance and satisfaction between on and off base personnel was employed to identify these areas in which the two groups differed.

The results of the analysis of importance and satisfaction yielded some interesting and surprising results. For both the on-base and off-base personnel, the order of importance of the ten items was identical. The indication is, then, that both groups look for the same characteristics in housing, be it on or off base.

The surprising portion of the analysis deals with the level of satisfaction. Even though these personnel who live off-base can select the location and the characteristics of the housing in which they live, and even though the satisfaction index between these personnel who live off-base is significantly different from those who live on-base, both groups are dissatisfied with nine of the ten items. This fact gives rise to several questions which remain unanswered by the original study.

The first question which should be investigated involves the reasons for the low satisfaction level in both groups. There is no indication of the reasons for the personal dissatisfaction of both on-base and off-base personnel with housing as it now exists. Even though the study shows, for example, that personal/individual privacy is considered to be both most important and most unsatisfactory by both groups, there are no indications of specific characteristics to be improved.

The second necessary area of investigation should concern an attempt to determine what factors cause certain personnel to live off-base. It seems strange that personnel are willing to pay for private quarters when they are dissatisfied with nine of the ten items being measured. It appears as though there may be one or more extremely important qualities of housing that have not been measured.

The result of the analysis comparing on and off base personnel is that the two groups display similar attitudes

in the areas of importance and satisfaction; therefore, it is recommended that improvements be pursued in the areas identified by the two previous summaries.

D. E-5 THROUGH E-6 ON-BASE MALE PERSONNEL

This group consisted of a sample size of 25 personnel. Initial investigation of the data disclosed there were no errors made in following the format of the desired responses. As a result, all the original data was included in this portion of the analysis.

1. Importance

Table XIII presents the summary statistics for the on-base personnel order of importance. The ranking of the ten items was done initially by the mean value of the response assigned to each item by the 25 subjects, with the lowest mean representing the most important item. Two items - furniture and safety/security - had identical means of 4.480; therefore, their order of rank was derived through use of the variances. Since furniture had the smaller variance of the two, it was arbitrarily considered more important than safety/security. So far as the remainder of the analysis goes, the rank was ignored and the two items were considered to be of equal importance.

Table XIV presents the results of the one-way analysis of variance of importance and displays a significant difference between the items' assigned ranks. The Duncan Multiple Range Test disclosed that personal/individual privacy was statistically different from the remaining nine

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	4.480	5.676	2
Fixtures	5.600	4.667	6
Personal Storage Space	5.200	4.752	4
Messing Facilities	5.240	6.940	5
Regulations/Policy	6.440	8.757	8
Building Maintenance	6.080	5.410	7
Building Location	6.720	6.293	9
Availability of Base Transportation	8.280	5.377	10
Personal/Individual Privacy	2.480	5.510	1
Safety/Security	4.480	10.008	3

*Lowest rank represents most important

Table XIII. Summary Statistics E-5 to E-6 On-Base Male Personnel Importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	545.14	60.571	9.581*
Error	240	1517.36	6.322	
Total	249	2062.50		

*Significant level $\alpha = .05$.

Table XIV. One-Way Analysis of Variance E-5 to E-6 On-Base Male Personnel Importance.

Duncan Multiple Range Test*

1	2	3	4	5	6	7	8	9	10

*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .264^*$$

The ranking of items is identical to the parametric ranking.

*Significant level $\alpha = .05$.

items and was considered to be the most important. There is no significant difference in the items ranked two through six, four through eight and five through nine. Availability of base transportation, item of rank ten, is statistically different from the items ranked one through nine and was considered to be the least important.

Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in ranking the items in their order of importance.

2. Satisfaction

Table XV presents the summary statistics for the on-base personnel satisfaction level. The ranking of the ten items was done initially by the mean value of the response assigned to each item by the 25 subjects, with the lowest mean representing the most unsatisfactory item. Two pairs of items safety/security, regulations/policy and messing facilities, personal/individual privacy had identical means of 2.640 and 2.840 respectively; therefore, their orders of rank were derived through use of the variances. The item with the smaller variance in each pair was ranked numerically lower than the item with the same mean for purposes of convenience only. So far as the remainder of the analysis was concerned, the rank was ignored and the two items were considered to be of equal importance.

Table XVI contains the results of the one-way analysis of variance of satisfaction and indicated no significant difference between the items' assigned ranks.

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	3.160	1.057	9
Fixtures	2.240	1.24	1
Personal Storage Space	2.880	1.943	8
Messing Facilities	2.840	1.556	6
Safety/Security	2.640	1.655	4
Regulations/Policy	2.640	1.656	5
Building Maintenance	2.520	1.843	3
Building Location	3.440	1.355	10
Availability of Base Transportation	2.400	1.500	2
Personal/Individual Privacy	2.840	1.639	7

*Lowest rank represents lowest satisfaction.

Table XV. Summary Statistics E-5 to E-6 On-Base Male Personnel Satisfaction.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	28.4	3.156	1.736
Error	240	436.2	1.818	
Total	249	464.6		

Table XVI. One-Way Analysis of Variance E-5 to E-6 On-Base Male Personnel Satisfaction.

Kendall's Coefficient of Concordance

$$W = .072.$$

There can be no comparison made of parametric and non-parametric ordering of ranks since Kendall's Coefficient of Concordance lacks significance. It may be concluded that the subjects did not apply the same standards in assigning a satisfaction index to the ten items.

3. Importance and Satisfaction

Table XVII displays the results of Spearman's Rank Correlation Coefficient between satisfaction and importance. Of the ten categories three show a significant correlation,

<u>Item</u>	<u>Rho</u>
Furniture	.094
Fixtures	- .195
Personal Storage Space	- .181
Messing Facilities	- .134
Regulations/Policy	.499*
Building Maintenance	.365*
Building Location	.287
Availability of Base Transportation	.554*
Personal/Individual Privacy	- .014
Safety/Security	.280

*Significant level $\alpha = .05$.

Table XVII. Spearman Rank Correlation Coefficient Between Importance and Satisfaction E-5 to E-6 On-Base Male Personnel.

implying a measure of dependence between the two variables being measured. The remaining seven items, appeared to be independent which implied that the subjects used different criteria in ranking the items in their order of importance and in assigning a value representing their level of satisfaction for each of the ten items.

4. Summary

Although Spearman's Rho disclosed some degree of independence between importance and satisfaction, there is little of value which can be gotten from the analysis of satisfaction and used as decision tools. Not only was there no significant difference between the satisfaction levels of the ten items, there was also no consistency among the subjects in the criteria used in ranking the items. In fact, the only useable information was that the subjects are dissatisfied with eight of the items with only furniture and building location ranked as high as "indifferent".

The analysis of importance, on the other hand, yielded considerable information through the one-way analysis of variance, the Duncan Multiple Range Test and Kendall's Coefficient of Concordance. Not only is there a significant difference in the ordering of items, but a consistency in the criteria used by the subjects in their ranking, as indicated by the significant concordance.

The satisfaction level of the E-5 to E-6 on-base male personnel may be increased considerably by improving the areas the subjects consider to be most important. For this group, initial improvements desired are in the areas of personal/individual privacy, furniture, safety/security, and personal storage space.

E. E-5 THROUGH E-6 OFF-BASE MALE PERSONNEL

This group originally consisted of 27 personnel; however, one data point was deleted from the portion of the analysis dealing with satisfaction. The reason for the deletion was that one of the subjects did not respond correctly to the format of the questionnaire and the insertion of his responses into the analysis would have contaminated the results. Since the same subject responded properly to the portion dealing with importance, his responses in that area were included in the analysis.

1. Importance

Table XVIII presents the summary statistics for the off-base personnel order of importance. The ranking of the

ten items was derived solely by the mean value of the response assigned to each item by the 27 subjects, with the lowest mean representing the most important item.

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	5.741	5.046	6
Fixtures	6.481	4.028	7
Personal Storage Space	4.815	3.849	4
Messing Facilities	5.111	4.641	5
Regulations/Policy	4.296	7.601	3
Building Maintenance	6.926	3.610	8
Building Location	7.741	5.046	9
Availability of Base Transportation	8.185	6.849	10
Personal/Individual Privacy	1.444	1.103	1
Safety/Security	4.259	7.199	2

*Significant level $\alpha = .05$.

Table XVIII. Summary Statistics E-5 to E-6 Off-Base Male Personnel Importance.

Table XIX presents the results of the one-way analysis of variance of importance and displays a significant difference between the items' assigned ranks. The Duncan Multiple Range Test discloses that personal/individual privacy is statistically different from the nine other items and is considered to be most important. There is no significant difference in the perceived importance of the items ranked two through five. Even though items ranked four through six are statistically the same, regulations/policy is statistically different from furniture. Although items of rank six and seven, seven and eight, eight and nine, and nine and ten are statistically the same, transitivity does not hold. Since transitivity does not hold, furniture is different from building maintenance which in turn differs from availability of base transportation.

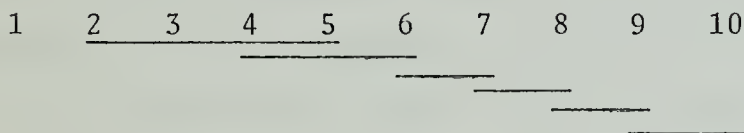
Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in ranking the items in their order of importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	954.24	106.027	21.651*
Error	260	1273.26	4.897	
Total	269	2227.5		

*Significant level $\alpha = .05$.

Table XIX. One-Way Analysis of Variance E-5 to E-6 Off-Base Male Personnel Importance.

Duncan Multiple Range Test*



*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .428^*$$

*Significant level $\alpha = .05$.

The ranking of items is identical to the parametric ranking.

2. Satisfaction

Table XX presents the summary statistics for the off-base personnel satisfaction level. The ranking of the ten items was done initially by the mean value of the response assigned to each item by the 26 subjects, with the lowest mean representing the most unsatisfactory item. Furniture,

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	3.038	1.398	4
Fixtures	3.038	1.638	5
Personal Storage Space	2.961	2.358	3
Messing Facilities	3.346	1.355	8
Safety/Security	2.923	1.674	2
Regulations/Policy	3.192	1.922	7
Building Maintenance	3.385	.758	9
Building Location	3.577	1.134	10
Availability of Base Transportation	2.615	1.126	1
Personal/Individual Privacy	3.038	2.838	6

*Lowest rank represents lowest satisfaction.

Table XX. Summary Statistics E-5 to E-6 Off-Base Male Personnel Satisfaction.

fixtures, and personal/individual privacy all had identical means of 3.038; therefore, their order of rank was derived through use of the variances. The item having the smallest variance received the lowest rank for purposes of convenience only. So far as the remainder of the analysis goes, the rank was ignored and the three items were considered to be of equal importance.

Table XXI contains the results of the one-way analysis of variance of satisfaction and displays the fact there is no significant difference between the items' assigned ranks.

There can be no comparison made of parametric and non-parametric ordering of ranks since Kendall's Coefficient of Concordance lacks significance. It may be concluded that the subjects did not apply the same standards in assigning a satisfaction index to the ten items.

3. Importance and Satisfaction

Table XXII displays the results of Spearman's Rank Correlation Coefficient between satisfaction and importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	17.496	1.944	1.179
Error	250	412.269	1.649	
Total	259	429.765		

Table XXI. One-Way Analysis of Variance E-5 to E-6 Off-Base Male Personnel Satisfaction.

Kendall's Coefficient of Concordance

$$W = .064.$$

<u>Item</u>	<u>Rho</u>
Furniture	- .376*
Fixtures	- .331*
Personal Storage Space	- .034
Messing Facilities	- .235
Regulations/Policy	.134
Building Maintenance	.050
Building Location	- .043
Availability of Base Transportation	.066
Personal/Individual Privacy	- .263
Safety/Security	.313

*Significant level $\alpha = .05$.

Table XXII. Spearman Rank Correlation Coefficient Between Importance and Satisfaction E-5 to E-6 Off-Base Male Personnel.

Of the ten items, two show a significant correlation, implying there is a dependence between the two variables being measured. It is reasonable to assume that for the ten items overall, the subjects used different criteria in ranking the items in the order of importance and in assigning a value representing their level of satisfaction for each of the items.

4. Summary

Although Spearman's Rho disclosed some degree of independence between importance and satisfaction, there is little of value which can be gotten from the analysis of satisfaction and used as decision-making tools. Not only was there no significant difference between the satisfaction levels of the ten items, but also there was no consistency among the subjects in the criteria used in ranking the items. Overall, the subjects are dissatisfied with personal storage space, safety/security and availability of base transportation while they are "indifferent" to the remaining seven items.

The statistical analysis of importance, on the other hand, yielded considerable information. Not only was there a significant difference in the ordering of items, but a consistency in the criteria used by the subjects in their ranking, as indicated by the significant concordance.

The satisfaction level of the E-5 to E-6 off-base male personnel may be increased considerably by improving the areas the subjects consider to be most important. For this group, initial improvements desired are in the areas of personal/individual privacy, safety/security, and regulations/policy.

F. E-5 THROUGH E-6 ON/OFF BASE MALE PERSONNEL

1. Importance

The results of the two-way analysis of variance of importance between the on-base and off-base personnel are displayed in Table XXIII. As illustrated, the difference

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	1369.384	152.154	27.263*
Location	1	0	0	
I x L	9	129.996	14.444	2.589*
Error	500	2790.620	5.581	
Total	519	4290		

*Significant level $\alpha = .05$.

Table XXIII. Two-Way Analysis of Variance E-5 to E-6 On/Off Base Male Personnel Satisfaction of Items vs. Location.

between items is statistically significant, which means there is a perceived order of importance. The perceived order of importance by the two groups with respect to location is not significantly different. It should be noted that the interaction between items and location is significant which implies that the location of the subjects may affect which items are considered to be most important.

2. Satisfaction

The results of the two-way analysis of variance of satisfaction between the on-base and off-base personnel are displayed in Table XXIV. As illustrated, there is a statistically significant difference between the levels of satisfaction of the ten ranked items. The significance of the F statistic related to location reveals a difference in satisfaction level between those personnel who reside on-base and those who reside off-base. There is not, however, a significant interaction between items and location.

3. Summary

Comparison of the results between the on-base and off-base personnel yielded meaningful results for the E-5 to

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	34.214	3.801	2.196*
Location	1	15.751	15.751	9.099*
I x L	9	11.682	1.298	.750
Error	490	848.469	1.731	
Total	509	910.116		

*Significant level $\alpha = .05$.

Table XXIV. Two-Way Analysis of Variance E-5 to E-6 On/Off Base Male Personnel Satisfaction of Items vs. Location.

E-6 subjects. The two-way analysis of variance of importance between on-base and off-base personnel disclosed that both groups of personnel statistically agreed on the order of importance of the measured items.

Although the one-way analysis of variance of satisfaction for both groups showed no significant difference in the level of satisfaction within each group, the two-way analysis of variance showed a significant difference in satisfaction between the two groups. Predictably, those personnel who live off-base were significantly more satisfied than those who live on-base. As a result of this difference, there are definite and positive steps which can be taken in raising the satisfaction level of the on-base personnel.

Since both groups show an agreement on the importance of the ten items and a disparity in their levels of satisfaction for those ten items, the reasons for the disparity must be investigated. The satisfaction level of the on-base personnel can be increased by identifying those characteristics which cause the off-base personnel to have the higher

satisfaction level. In particular, the areas to be emphasized in additional studies should be fixtures, messing facilities, regulations/policy, building maintenance and personal/individual privacy.

Until such time as the specific factors which affect satisfaction are identified, efforts should be made to improve the areas of personal/individual privacy, furniture, safety/security and personal storage space for the on-base group.

G. O-1 THROUGH O-3 ON-BASE MALE PERSONNEL

This group consisted of a sample size of 14 people. Initial investigation of the data disclosed there were no errors made in following the format of the desired responses. As a result, all the original data was included in this portion of the analysis.

1. Importance

Table XXV presents the summary statistics for the on-base personnel order of importance. The ranking of the ten items was derived solely by the mean value of the response assigned to each item by the 14 subjects, with the lowest mean representing the most important item.

Table XXVI presents the results of the one-way analysis of variance of importance and displays a significant difference between the items' assigned ranks. The Duncan Multiple Range Test discloses that personal/individual privacy is significantly different from the other nine items and is considered to be the most important of the items.

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	5.214	7.104	4
Fixtures	6.143	4.064	8
Personal Storage Space	5.643	4.862	6
Messing Facilities	4.071	4.071	2
Regulations/Policy	4.357	7.632	3
Building Maintenance	6.071	3.456	7
Building Location	6.571	8.571	9
Availability of Base Transportation	9.571	.879	10
Personal/Individual Privacy	1.786	1.566	1
Safety/Security	5.571	7.033	5

*Lowest rank represents most important.

Table XXV. Summary Statistics 0-1 to 0-3 On-Base Male Personnel Importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	474.286	52.698	10.064*
Error	130	680.714	5.236	
Total	139	1155		

*Significant level $\alpha = .05$.

Table XXVI. One-Way Analysis of Variance 0-1 to 0-3 On-Base Male Personnel Importance.

Duncan Multiple Range Test*

1 2 3 4 5 6 7 8 9 10

*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .433*$$

*Significant level $\alpha = .05$.

The items ranked two through six, three through eight, and four through nine are perceived by the subjects to be of equal importance. It should be noted, however, that messing

facilities (rank 2) is different from building maintenance (rank seven) and that regulations/policy (rank 3) is different from building location (rank 9). Finally, availability of base transportation is considered to be significantly less important than the nine higher ranked items.

Kendall's Coefficient of Concordance disclosed that the subjects applied essentially the same standard in ranking the items in their order of importance.

2. Satisfaction

Table XXVII presents the summary statistics for the on-base personnel satisfaction level. The ranking of the ten items was done initially by the mean value of the response assigned to each item by the 14 subjects, with the lowest mean representing the least satisfactory item. For this group of subjects, however, there were two pairs of items which had identical means. The items furniture and fixtures both had means of 3.143; however, since furniture had the smaller variance, it received rank three and fixtures was ranked fourth. Messing facilities and building maintenance had not only the same mean (3.357) but equal variances as well (1.478). As a result, the two items received the identical rank of 7.5.

Table XXVIII presents the results of the one-way analysis of variance of satisfaction and displays a significant difference between the items' assigned ranks. The Duncan Multiple Range Test disclosed that only building location,

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>	<u>Rank**</u>
Furniture	3.143	.592	3	4
Fixtures	3.143	1.207	4	3
Personal Storage Space	3.071	1.302	2	2
Messing Facilities	3.357	1.478	7.5	7
Safety/Security	3.286	.989	6	5.5
Regulations/Policy	2.857	1.209	1	1
Building Maintenance	3.357	1.478	7.5	9
Building Location	4.571	.264	10	10
Availability of Base	3.214	.335	5	5.5
Transportation	3.428	1.187	9	8
Personal/Individual Privacy				

*Lowest rank represents lowest satisfaction.

**Ranking yielded by Kendall's Coefficient of Concordance.
Lowest rank represents lowest satisfaction.

Table XXVII. Summary Statistics 0-1 to 0-3 On-Base Male Personnel Satisfaction.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	26.971	2.997	2.985*
Error	130	130.572	1.004	
Total	139	157.543		

*Significant level $\alpha = .05$.

Table XXVIII. One-Way Analysis of Variance 0-1 to 0-3 On-Base Male Personnel Satisfaction.

Duncan Multiple Range Test*

1 2 3 4 5 6 7.5 9 10

*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .191^*$$

*Significant level $\alpha = .05$.

which received the rank of ten, is statistically different from any of the other items. The subjects showed no difference in satisfaction level between the first nine items.

Kendall's Coefficient of Concordance disclosed that the subjects applied essentially the same standard in assigning a satisfaction index to each of the ten items. Further results of this test disclosed a difference in ranking from that derived solely through the ordering of means (Table XXVII). The difference in ranking is minor enough, however, to permit the results of the Duncan Multiple Range Test to be used in making statistical inferences.

3. Importance and Satisfaction

Table XXIX displays the results of Spearman's Rank Correlation Coefficient between satisfaction and importance. Of the ten items, two show a significant correlation, implying there is a dependence between the two variables being measured. It is reasonable to assume that, for the ten items overall, the subjects used different criteria in ranking the items in their order of importance than they did in assigning a satisfaction index to each of the ten items.

4. Summary

The responses of the 0-1 to 0-3 on-base personnel group yielded considerable information regarding importance and satisfaction. Since Spearman's Rho revealed some degree of independence between the two categories, importance and satisfaction, it can be assumed that the subjects were actually expressing different attitudes when assigning rank

<u>Item</u>	<u>Rho</u>
Furniture	.078
Fixtures	- .520*
Personal Storage Space	.112
Messing Facilities	- .132
Regulations/Policy	.528*
Building Maintenance	.380
Building Location	- .384
Availability of Base Transportation	- .244
Personal/Individual Privacy	.444
Safety/Security	.109

*Significant level $\alpha = .05$.

Table XXIX. Spearman Rank Correlation Coefficient Between Importance and Satisfaction 0-1 to 0-3 On-Base Male Personnel.

values of importance and in assigning satisfaction indices to the ten items.

A second important consideration is that for both importance and satisfaction, Kendall's Coefficient of Concordance disclosed that the subjects agreed on the order of importance and the level of satisfaction with the ten items.

It must be noted, however, that this group is dissatisfied with only one item, regulations/policy, as conditions now exist. The subjects are indifferent to eight of the remaining nine categories and satisfied with building location. This must be borne in mind when deciding what, if any, improvements are to be made.

It should also be noted that even though personal/individual privacy is considered to be significantly more important than the other nine items, the subjects rank that category next to the highest in satisfaction level with a mean of 3.428.

Based on the comparison of order of importance and satisfaction index it is recommended that improvements be made in the low cost area of regulations/policy. It is felt that, due to the comparatively high satisfaction levels of the remaining items, any available funds could be better utilized by making improvements to the E-2 through E-4 and E-5 through E-6 quarters rather than to the O-1 through O-3 quarters.

H. O-1 THROUGH O-3 OFF-BASE MALE PERSONNEL

This group originally consisted of 31 personnel, however since one subject failed to respond correctly to the format of the questionnaire, his responses were deleted in order to avoid any possible contamination the data may cause. As a result, the sample size for both importance and satisfaction analyses consisted of 30 data points.

1. Importance

Table XXX presents the summary statistics for the off-base personnel order of importance. The ranking of the ten items was derived solely by the mean value of the response assigned to each item by the 30 subjects, with the lowest mean representing the most important item.

Table XXXI presents the results of the one-way analysis of variance of importance and displays a significant difference between the items' assigned rank. The Duncan Multiple Range Test discloses that personal/individual privacy is considered to be significantly more important than the remaining nine items, while availability of base

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	4.167	5.661	2
Fixtures	5.433	5.150	6
Personal Storage Space	5.000	2.828	4
Messing Facilities	4.800	6.855	3
Regulations/Policy	6.367	4.585	8
Building Maintenance	6.767	3.771	9
Building Location	6.300	5.528	7
Availability of Base Transportation	9.433	1.426	10
Personal/Individual Privacy	1.400	.524	1
Safety/Security	5.333	9.885	5

*Lowest rank represents most important

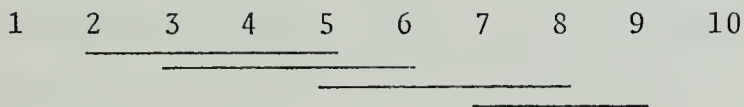
Table XXX. Summary Statistics 0-1 to 0-3 Off-Base Male Personnel Importance.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	1134.8	126.089	27.286*
Error	290	1340.2	4.621	
Total	299	2475		

*Significant level $\alpha = .05$.

Table XXXI. One-Way Analysis of Variance 0-1 to 0-3 Off-Base Male Personnel Importance.

Duncan Multiple Range Test*



*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .459^*$$

*Significant level $\alpha = .05$.

transportation is considered to be significantly less important than the other items. It is further shown that the items ranked two through five, three through six, five through eight, and seven through nine are considered to be of equal importance. Since, however, transitivity fails to hold, the item of rank two differs from six, four from seven and six from nine.

Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in ranking the items in their order of importance.

2. Satisfaction

Table XXXII presents the summary statistics for the off-base satisfaction level. The ranking of the ten items was derived solely by the mean value of the response assigned to each item by the 30 subjects, with the lowest mean representing the lowest level of satisfaction.

Table XXXIII contains the results of the one-way analysis of variance of satisfaction and displays a significant difference between the items' assigned ranks. The Duncan Multiple Range Test discloses that no one item has a significantly lower or higher ranking than the remaining nine items. In fact, the only differences are that the items ranked one and two differ from those ranked nine and ten and the items ranked one through four differ from the item ranked tenth.

Kendall's Coefficient of Concordance discloses that the subjects applied essentially the same standard in assigning a satisfaction index to each of the ten items.

<u>Item</u>	<u>Mean</u>	<u>Variance</u>	<u>Rank*</u>
Furniture	3.500	1.224	7
Fixtures	3.300	1.734	4
Personal Storage Space	2.933	2.133	1
Messing Facilities	3.400	1.283	5
Safety/Security	3.733	.754	9
Regulations/Policy	3.433	1.082	6
Building Maintenance	3.567	.737	8
Building Location	3.967	.792	10
Availability of Base Transportation	3.067	.892	3
Personal/Individual Privacy	2.967	2.516	2

*Lowest rank represents lowest satisfaction.

Table XXXII. Summary Statistics 0-1 to 0-3 Off-Base Male Personnel Satisfaction.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	29.88	3.32	2.525*
Error	290	381.267	1.315	
Total	299	411.147		

*Significant level $\alpha = .05$.

Table XXXIII. One-Way Analysis of Variance 0-1 to 0-3 Off-Base Male Personnel Satisfaction.

Duncan Multiple Range Test*

1	2	3	4	5	6	7	8	9	10
<hr style="width: 100%; border: 1px solid black;"/>									

*There is no significant difference between ranks joined by lines.

Kendall's Coefficient of Concordance

$$W = .087^*$$

*Significant level $\alpha = .05$.

3. Importance and Satisfaction

Table XXXIV displays the results of Spearman's Rank Correlation Coefficient between satisfaction and importance. Of the ten categories, three show a significant correlation, implying there is a dependence between the two variables being measured. The correlation for personal storage space, furthermore, is extremely close to being significant (.302 vs. .306). It can be assumed that, for the ten items overall, the questionnaire is not measuring both importance and satisfaction but only one of the two.

<u>Item</u>	<u>Rho</u>
Furniture	.102
Fixtures	.412*
Personal Storage Space	.302
Messing Facilities	.019
Regulations/Policy	.036
Building Maintenance	.038
Building Location	- .497*
Availability of Base Transportation	- .058
Personal/Individual Privacy	.173
Safety/Security	- .408*

*Significant level $\alpha = .05$.

Table XXXIV. Spearman Rank Correlation Coefficient Between Importance and Satisfaction 0-1 to 0-3 Off-Base Male Personnel.

4. Summary

The results of Spearman's Rank Correlation Coefficient must be borne in mind when decisions are made pertaining to satisfaction and importance of the ten rated items. Since there is dependency in three of the ten categories and a fourth category in which independence (are one in the

same to the subjects). As a result, the area of importance should be used in the decision-making process.

The recommendation to use the analysis of importance in the decision-making process is based solely on the amount of information derived from the Duncan Multiple Range Test. The test applied to the area of importance yields a greater separation between categories than the test applied to the area of satisfaction. In other words, the ten point scale resulted in a clearer discrimination between the categories.

It appears, then, as though the off-base satisfaction level may be increased considerably by improving the areas of personal/individual privacy, furniture, messing facilities, personal storage space and safety/security.

I. 0-1 THROUGH 0-3 ON/OFF BASE MALE PERSONNEL

1. Importance

The results of the two-way analysis of variance of importance between the on-base and off-base personnel are displayed in Table XXXV. As illustrated, the difference between items is statistically different, which means that there is a perceived order of importance. The perceived order of importance by the two groups with respect to location is not significantly different.

2. Satisfaction

The results of the two-way analysis of variance of satisfaction between the on-base and off-base personnel are displayed in Table XXXVI. As illustrated, there is a

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	1564.5	173.833	36.125*
Location	1	0	0	
I x L	9	44.585	4.954	1.029
Error	420	2020.915	4.812	
Total	439	3630		

*Significant Level $\alpha = .05$.

Table XXXV. Two-Way Analysis of Variance 0-1 to 0-3 On/Off Base Male Personnel Importance of Items vs. Location.

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Items	9	44.146	4.905	4.024*
Location	1	.183	.183	.150
I x L	9	12.706	1.412	1.158
Error	420	511.839	1.219	
Total	439	568.874		

*Significant Level $\alpha = .05$.

Table XXXVI. Two-Way Analysis of Variance 0-1 to 0-3 On/Off Base Male Personnel Satisfaction of Items vs. Location.

statistically significant difference between the levels of satisfaction of the ten ranked items. There is not, however, a significant difference in satisfaction level between those who live on-base and those who live off-base.

3. Summary

A comparison of the on-base and off-base groups of personnel yields little insight for improving on-base housing. There is no significant difference in the order of importance of the ten items between the personnel who live on-base and those who live off-base. The indication is, then, that both groups look for the same characteristics in

housing. There is not, however, any difference in satisfaction level between those who live on-base and those who live off-base. As a result, the best information available pertaining to necessary improvements in on-base housing comes from those personnel who live on-base.

As was pointed out previously, the on-base personnel are dissatisfied with only one area, i.e., regulations/policy. It is, therefore, recommended that an investigation aimed at examining this area be undertaken. It is further recommended that, since the O-1 to O-3 personnel are considerably more satisfied than any of the other groups analyzed in this study, any available funds could be better utilized by making improvements to the E-2 through E-4 and E-5 through E-6 quarters rather than to the O-1 through O-3 quarters.

IV. CONCLUSION

The results of the analysis for the E-2 through E-4 group suggests that the personnel who live off-base are more satisfied with the ten items than are those personnel who live on-base. Furthermore, the analysis clearly identifies areas in which improvements can be made to improve the satisfaction level of the on-base personnel. The analysis does not disclose, however, why both the on-base and off-base groups are dissatisfied with nine of the ten items being evaluated; nor does the analysis disclose the reason personnel are willing to live off-base even though they are dissatisfied with nine of the ten items. As has been previously mentioned, additional investigations are necessary to determine what characteristics of quarters cause these personnel to live off-base. It is apparent that there is one or more extremely important qualities of housing that have not been measured.

The results of the analysis for the E-5 to E-6 groups are extremely useful in that the on and off base groups have essentially the same order of importance throughout the ten items. Furthermore, there is statistical evidence that the off-base personnel are significantly more satisfied than are those personnel who live on-base. By using the off-base group as a basis for comparison, the areas which should be improved in government quarters can be readily identified.

The fact that Kendall's Coefficient of Concordance disclosed that neither the on-base nor the off-base personnel were applying the same standard in assigning a satisfaction index to the ten items indicates the need to increase the sample size until significant consistency does occur.

Analysis of the O-1 through O-3 group discloses there is no difference in either the order of importance or the satisfaction index between those who live on-base and those who live off-base. The analysis does reveal, however, that the on-base personnel are dissatisfied with only regulations/policy. As a result, some corrective measures should be undertaken in that area. It is felt, furthermore, that, since these personnel who live off-base are no more satisfied than those who live on-base and since the O-1 to O-3 on-base personnel are significantly more satisfied than either of the other previous groups, initial efforts be put into raising the satisfaction level of the E-2 through E-6 personnel.

APPENDIX A

IMPORTANCE

I. Rank The Following Items From 1 to 10 In Their Degree of Importance To You As An Individual, Number 1 Being Most Important Number 10 Least Important.

RANK	ITEM
_____	Furniture
_____	Fixtures
_____	Personal Storage Space
_____	Messing Facilities
_____	Regulations/Policies
_____	Building Maintenance
_____	Building Location
_____	Availability of Base Transportation
_____	Personal/Individual Privacy
_____	Safety/Security

SATISFACTION

II. As Pertains To Your Present Living Quarters Indicate Your Overall Degree of Satisfaction In The Following Ten Categories, Using The Following Index.

1	2	3	4	5
VERY DISSATISFIED	DISSATISFIED	INDIFFERENT	SATISFIED	VERY SATISFIED

INDEX

ITEM

- _____ Furniture (Desk, Bed, Chair, Table, etc.)
- _____ Fixtures (Carpets, Curtains, Lamps, Heads, etc.)
- _____ Personal Storage Space
- _____ Messing Facilities
- _____ Safety/Security
- _____ Regulations/Policy
- _____ Building Maintenance
- _____ Building Location
- _____ Availability of Base Transportation
- _____ Personal/Individual Privacy

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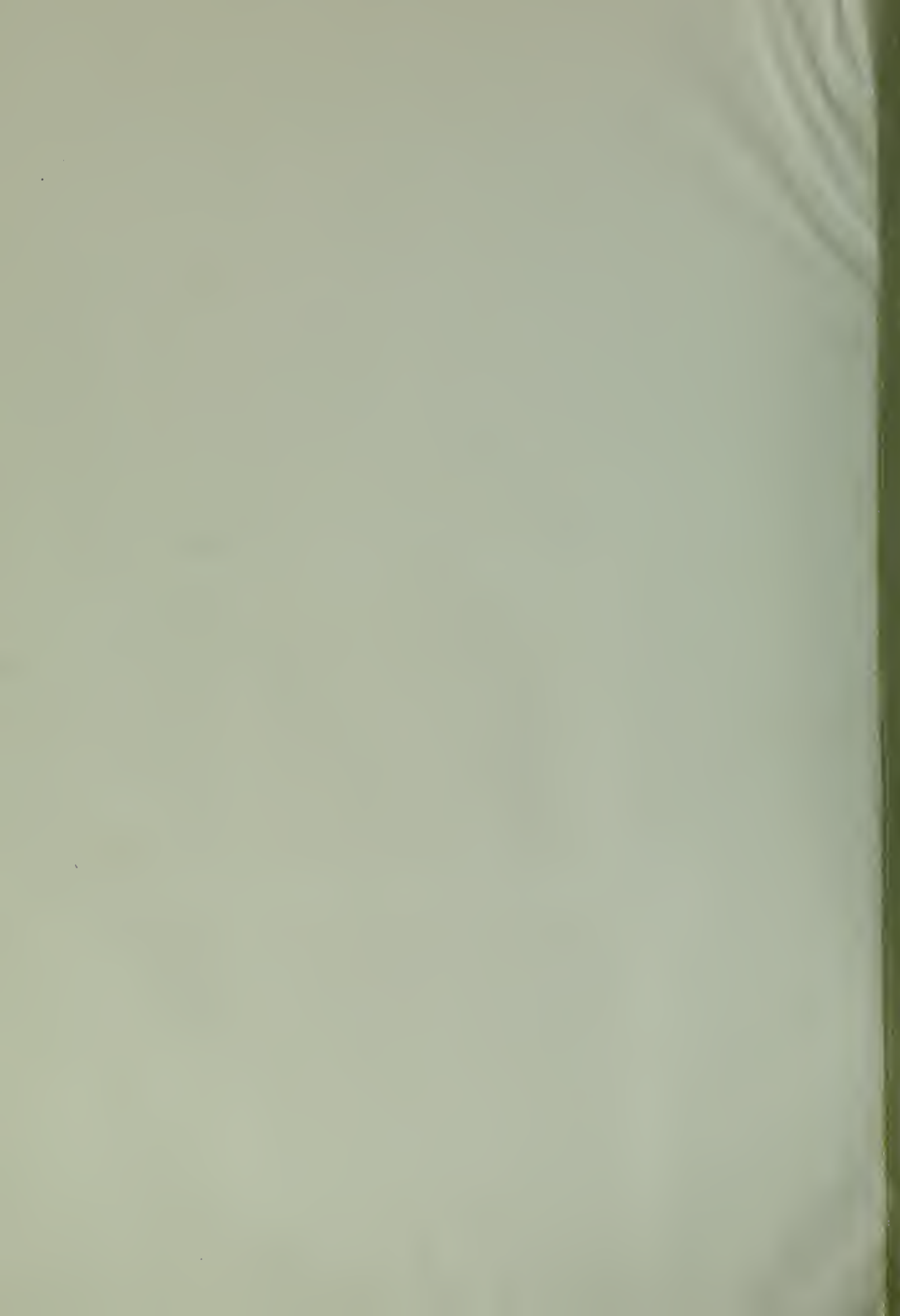
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