A Scale to Measure Time Use Efficiency of Agricultural Scientists

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ABSTRACT

The felt urgency for a quick technological breakthrough in agricultural research to address a number of pressing issues has entailed the growing need for agricultural scientists to make use of time as productive as possible. In this context, the present study had been undertaken to measure the extent of time use efficiency among agricultural scientists. The sample of the study comprised of two hundred agricultural scientists drawn across cadres from a high performing institute (HPI) and a low performing institute (LPI). Standard steps were followed to develop a suitable Likert type measuring scale. It is evident from the findings that as high as 46% of scientists from the LPI had a low level of time use efficiency, whereas only 6% of them were highly time use efficient. A majority of agricultural scientists from the HPI had a medium level of time use efficiency. As high as 29.5% of the pooled sample were found to express only a little concern over efficient use of time. A one way ANOVA yielded a statistically significant result to imply that the several cadres of agricultural scientists under study had differed in terms of their time use efficiency.

Key words : *Scale; Measure; Time use efficiency; Agricultural Scientists;*

In light of the ever expanding demand for immediate delivery of technologies, products, information and other inputs to the farmers' fields, the temporal dimension of research has gained larger importance. In one hand, population pressure has increased manifold, on the other hand environmental issues have emerged anew, posing a gargantuan threatto national food security. The situation urgently demands a technological breakthrough to tackle multiple issues. This is well understood that to timely get rid of the pressing issues, the scientists working under the public agricultural research system need to be time conscious. In this context, it was felt very relevant to gauge the attitude of agricultural scientists towards making productive use of time. Accordingly, the present study had been designed to construct a suitable scale and thereby to measure time use efficiency of agricultural scientists.

METHODOLOGY

An *ex-post facto* research design was adopted in the present study. It was decided to conduct the study in two differently performing agricultural institutes in order to understand whether time use efficiency of agricultural scientists varies across institute or not. Accordingly, following the composite ranking of Indian agricultural universities on different parameters by *Education Times (2009)*, purposively IARI, New Delhi was selected among the high performing institutes (HPIs) and CSAUA&T, Kanpur, Uttar Pradesh was selected among the low performing institutes (LPIs). A multistage disproportionate stratified random sampling (without replacement) technique (*Cochran, 1977*) was adopted and a sample of two hundred agricultural scientists, hundred each from the HPI and LPI was drawn. Time use efficiency was operationalized as the degree to which the scientist had completed the assigned or required task within deadline with reasonable quality and had not faced the problem of procrastination. The steps followed in construction of a *Likert (1932)* type time use efficiency scale have been given below:

Collection of statements pertaining to time use efficiency: Relevant literatures available in the field were carefully scanned and statements pertaining to time use efficiency werecollected. A total of 33 statements were finalized for scrutiny in consultation with the experts.

Scrutiny and editing of time use efficiency statements: In light of the informal criteria for editing statements as

suggested by *Likert (1932),* and *Edwards and Kilpatrick (1948),* the collected statements were carefully scrutinized and edited. Ambiguous, repeated and restructured statements were necessarily discarded and21statements were retained for further analysis.

Primary administration: A proforma was designed with these 21 statements, each having five response categories, *viz.*, strongly disagree, disagree, undecided, agree, and strongly agree. A representative sample of respondents comprising of 50 agricultural scientists was drawn. They were personally interviewed and asked to respond in any one of the five response categories against each statement according to their perception.

Analysis of time use efficiency statements and scoring: The favourable statements were given a scoring pattern of 0 to 4 and a reverse scoring pattern was adopted for the unfavourable statements. Summation of scores for the individual statements yielded the total score obtained by an individual respondent.

Final Selection of time use efficiency statements: First, the frequency distribution of scores obtained by the fifty respondents was done. In order to evaluate the individual statements, the method suggested by *Edwards (1969)* was followed. Twenty five percent of respondents with the highest total scores and also twenty five percent of the respondents with the lowest total scores were taken as the criterion groups. The 't' values for the statements were calculated as:

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum(X_H - \bar{X}_H)^2 + \sum(X_L - \bar{X}_L)^2}{n(n-1)}}}$$

Where,

$$\sum(X_H - \bar{X}_H)^2 = \sum X_H^2 - \frac{(\sum X_H)^2}{n}$$

$$\sum(X_L - \bar{X}_L)^2 = \sum X_L^2 - \frac{(\sum X_L)^2}{n}$$

$\bar{X}_H$ = the mean score on a given statement for high group
$\bar{X}_L$ = the mean score on a given statement for the low group
n = total number of subjects

Only those statements with significant 't' values (t $\geq$1.75) were retained and incorporated in the final scale. Thus, the scale to measure time use efficiency consisted of 13 statements.

Validity and reliability of the scale: A panel was formulated with twenty five experts comprising of senior and principal scientists, research managers, and administrators to establish content validity of the measuring instrument developed. Following *Samanta (1977)* each statement of the measuring scale was administered to the group of experts with two response categories, namely, agree and disagree. The experts were asked whether each of the13 statements could relate to the particular area of investigation or not. Statements having 20 per cent rejection rate were considered for exclusion from the final scale, although none of the statements were found to have a rejection rate of 20 per cent or above. The scale was pretested by applying split-half technique with thirty non-sample respondents in order to find out its reliability. The coefficient of internal consistency obtained was 0.86.

Scoring technique of the scale: Each statement in the final scale had a five-point continuum, i.e., strongly disagree, disagree, undecided, agree, and strongly agree. The scoring pattern adopted for the favourable statements was 0, 1, 2, 3 and 4, respectively for strongly disagree, disagree, undecided, agree and strongly agree categories. It was reversed for the unfavourable statements.

RESULTS AND DISCUSSION

Time use efficiency scale: The t values of 21 time use efficiency statements lied between 0.19 and 2.62. Thirteen statements were found to have significant 't' values ($\geq$ 1.75) (Table 1). Thus, the final scale consisted of 13 statements of which 6 statements were favourable and remaining 7 were unfavourable statements (Table 2).

*Time use efficiency among agricultural scientists :*The percentage and frequency distribution of agricultural scientists along the time use efficiency continuum has been given in Table 3. Majority (62%) of the agricultural scientists from the HPI and about half (48%) of the total number of agricultural scientists from the LPI had medium level of time use efficiency. As against only 13 per cent of agricultural scientists from the HPI, near about half (46%) of the total number of agricultural scientists from the LPI had lower level of time use efficiency. Lack of adequate concern for maintaining deadline and procrastinating behaviour might be among the various reasons for such inefficiency in effective use of time. *Lay and Schouwenburg (1993)* found that people with higher trait of procrastination were low in setting goal and priority and showed greater likelihood to fail the schedule of personal projects.Whereas around one fourth (25%) of the agricultural scientists from the HPI were highly time use efficient, only 6 per cent of agricultural scientists from the LPI had higher level of time use efficiency. Data in Table 3 further depicted

that a majority (58.57%) of Associate Professors from the LPI belonged to the low category of time use efficiency whereas majority (62%) of the Senior Scientists from the HPI had medium level of the same. Such medium level of time use efficiency was observed among 40% of the Associate Professors of the LPI. Not even two percent of Associate Professors of the LPI could be placed in the high category of time use efficiency continuum. High level of time use efficiency was prevalent among slightly above one fifth (22%) of the Senior Scientists from the HPI. Senior Scientists from the HPI falling in the low category in this respect was found to be 16 per cent. Majority of both Professors (66.66%) from the LPI and Principal Scientists (62%) from the HPI belonged to the medium category of time use efficiency (Table 3). Professors from the LPI scoring high on time use efficiency were 16.67 per cent. Same was the percentage of Professors from the LPI scoring low in this regard. One tenth (10%) and above one fourth (28%) of Principal Scientists from the HPI could be placed respectively in low and high category of time use efficiency.

Aggregating responses of the samples from the two institutes, it was concluded that more than half (55%) of the pooled sample had medium level of time use efficiency. High level of time use efficiency was prevalent among 15 per cent of the pooled sample of respondents. Remaining 29.5 per cent of the pooled sample was somehow indifferent in efficient use of time. Indifferent attitude to make efficient use of time may result in task overload, and increased strain that may ultimately affect quality of the task accomplished. As reported by *Jex and Elacqua (1999)* a moderating effect of time management behaviour on strain existed.

Table 1: Statements related to time use efficiency and their t-values

Statement	t value
Even though I have goals set for my work, I find problems in setting priorities.	2.62*
I tend to spend more than the time required for relatively unimportant activities.	2.49*
I like to maintain punctuality at my workplace.	0.29
I have a tendency to postpone work.	2.42*
I need to take frequent breaks while working.	0.28
I make proper allotment of time to my diverse work plans.	1.59
I find myself unable to complete work within deadline.	2.19*
I prepare 'things to do' list daily before starting my works.	1.98*
I never succumb to the pressure of job assigned by my superiors.	1.96*
I try to avoid long duration meetings during the working hour.	1.18
I consciously avoid my involvement into unproductive activities.	1.95*
I spend a considerable amount of time in planning and searching for opportunities for growth and development.	1.91*
I spend a lot of time in building relationship and activities for long term growth.	1.85*
I face problems in organizing things.	1.42
As far as possible, I try to avoid phone calls during the working hours.	0.43
My everyday schedule is hampered by unexpected and urgent tasks.	2.46*
I find time available to complete an assigned task is not sufficient.	0.36
I hate deadlines.	2.42*
I always find time to slip away.	0.19
For me finishing a task is important not the time it consumes.	2.03*
I not only have 'things to do' list but my commitment to carry out tasks according to the list.	1.96*

* t values are significant ($\geq$ 1.75)

Table 2: The time use efficiency scale

Statement	Nature
I prepare 'things to do' list daily before starting my works.	+
Even though I have goals set for my work, I find problems in setting priorities.	-
I consciously avoid my involvement into unproductive activities.	+
For me finishing a task is important not the time it consumes.	-
I spend a considerable amount of time in planning and searching for opportunities for growth and development.	+
I have a tendency to postpone work.	-
I never succumb to the pressure of job assigned by my superiors.	+
I find myself unable to complete work within deadline.	-
I not only have 'things to do' list but my commitment to carry out tasks according to the list.	+
I tend to spend more than the time required for relatively unimportant activities.	-
I spend a lot of time in building relationship and activities for long term growth.	+
I hate deadlines.	-
My everyday schedule is hampered by unexpected and urgent tasks.	-

+ favourable statements;
- unfavourable statements

Table 3: Distribution of respondents from LPI and HPI according to their level of time use efficiency (N=200)

Degree of time use efficiency	Low Performing Institutes (LPIs)			High Performing Institutes (HPIs)			Pooled sample
	Asso. Prof. [n_1=70]	Professor [n_2=30]	Total [N_1=100]	Sr. Scientist [n_3=50]	PS [n_4=50]	Total [N_2=100]	[N=200]
Low (<26.65)	41 (58.57%)	5 (16.67%)	46 (46%)	8 (16%)	05 (10%)	13 (13%)	59 (29.5%)
Medium (26.65 – 35.12)	28 40%)	20 (66.66%)	48 (48%)	31 (62%)	31 (62%)	62 (62%)	110 (55%)
High (>35.12)	01(1.43%)	05 (16.67%)	06 (6%)	11 (22%)	14 (28%)	25 (25%)	31 (15.5%)

Table 4: Calculated F values depicting significance of variation in time use efficiency (N=200)

Cadre	N	Mean	SD	F
Associate Professor, LPI	70	26.01	4.95	18.147
Professor, LPI	30	30.77	6.33	with
Senior Scientist, HPI	50	31.60	5.90	(3,196)
Principal Scientist, HPI	50	32.98	5.63	df at
Pooled sample	200	29.86	6.27	.000

Variation in time use efficiency among the groups of agricultural scientists : Mean time use efficiency score obtained by Associate Professors of the LPI was 26.01. Professors of the LPI obtained a mean score of 30.77 in time use efficiency. Senior Scientists and Principal Scientists from the HPI on an average had obtained a mean score of 31.60 and 32.98 respectively in time use efficiency. The results arrived after applying a one way analysis of variance depict that different cadres of agricultural scientists under the study had significantly varied in terms of their time use efficiency, $F(3,196) = 18.147$, $p<.001$ (Table 4).

CONCLUSION

The present study represented a scale to measure time use efficiency of scientists. The scale developed in course of the study was made use of gauging concern of agricultural scientists over making efficient use of time. As evident from the findings, a considerably larger proportion of agricultural scientists had only a medium to low level of time use efficiency. It entailed a definite need for sensitizing the agricultural research institutions in general and scientists working under them in particular to enhance their skill to make efficient use of time. Time use interventions are necessary to make in diverse forms. Training programmes at regular intervals comprising of effective time management modules including time assessment, planning, prioritization and goal setting should be organized at institute level for enhancing time use efficiency of the agricultural scientists.

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