MEDIATION EFFECT OF INCENTIVES AND REGULATIONS ON ENERGY CONSERVATION: A CASE OF COMMERCIAL CONSUMER MODEL IN SRI LANKAN ELECTRICITY SECTOR

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Abstract*—Presently Ceylon Electricity Board (CEB) experiences a severe shortage of energy due to various reasons. Primarily, it is on inadequate generation capacity, lack of infrastructure and waste of scarce energy resources with improper conservation means. This plays a vital role in national economy and hence, same is having severe R&D interests. In this context, energy conservation by means of different intervention mechanisms has become dominant. In Sri Lankan electricity sector 22% of total energy demand is absorbed by the commercial consumers which composed of 2% hotel consumers, 1% government institutions and 19% general purpose consumers. The major portion is covered by the general purpose consumers such as supermarkets, service stations, banks, private institutions and shopping complexes. Study found that there exist three major determinants pertaining to energy conservation. Tariff regime, technology input and consumer behaviour have become those three components. This research paper studies how these components can be influenced by different mediators such as incentives and regulations. Random sample of Four Hundred commercial consumers of Colombo, Kalutara and Gampaha districts including 325 general purpose consumers, 50 small and large scale hotels and 25 government institutions are taken in to account for this study. Structured questionnaire survey is used as the research strategy. Data is analysed using structural equation modelling techniques available in 25th version of AMOS software. Findings show that there exists a strong mediation of incentives on changing consumer behaviour pattern towards energy conservation especially, among the general purpose consumers. The government institutions experience partial mediation effect of regulations on technology towards energy conservation. Hotel sector experiences partial mediation of incentives on changing usage pattern and technology towards conservation. The model developed within this study can be used as the scientific instrument to decide different level of incentives and regulations which can act as mediating variable for energy conservation in commercial sector.

Keywords*—energy conservation; incentives; interventions; regulations; structural equation modeling; tariff regimes; technology management;

I. INTRODUCTION

CEB is the government owned electricity provider who generates, transmits and distributes electricity among its stakeholders. The unit cost of electricity is presently at 20.00Rs and it is approximately around 1USD. There are more than 6 million electricity consumers in the country. If 1unit of electricity per consumer is conserved in a month, the total monthly saving will be Rs120 Million. Accordingly, the annual saving will be Rs1.44Billion. This is a massive amount and it is equivalent to the 0.5% of annual turnover of CEB. Therefore, energy conservation is a highly profitable phenomenon with respect to the economic aspects as well as managing the utility's financial bottom line at an acceptable level as in [1]. CEB has launched several intervention mechanisms to conserve electricity even from several decades, however many of such programs failed to reach the hearts of the electricity consumers due to various unidentified problems as in [2]. This research paper explores the possible reasons for premature failures of several intervention mechanisms introduced by CEB time to time and thereby to formulate strategy to overcome the situation scientifically. Normally, people would continually engage in a behavior, if they psychologically feel positive about the outcome of that behavior as explained in [3]. Therefore, this research study aims to theoretically explain why CEB's energy saving stimulus are unable to influence on electricity conservation behavior among the commercial consumers by testing the mediating effect of consumer motivation by means of incentives and regulations. Normally, efficiency involves the cost while conservation involves the behavior as explained in [4]. Electricity conservation creates financial viability and reduces the disastrous Green House Gas (GHG) emission in the long run as per [5]. It has found that utility's intervention mechanism on energy conservation over Sri Lankan domestic consumers insufficient as per [6]. Further, [7] explains that even for industrial consumers of Sri Lanka, the intervention mechanisms have failed prematurely due to unavailability of scientific approach. Therefore, this research paper explores the possibility of developing a scientific model to explain the different intervention mechanisms of utility towards energy conservation especially on commercial consumers. There are about 600,000 commercial consumers representing 22% of total energy demand and 10% of consumer base in the country as in [1]. Therefore, this study reserves a very high significance in terms of energy conservation aspects of the sector.

A. *Research gap and Significance of the Study*

Energy conservation is the primary strategy for climate change mitigation [8]. The major drawback on this exercise is hidden barriers [9]. Those barriers involve inadequate interventions from utility, poor awareness campaigns, lack of information sharing and extra cost [10]. Documented research [11] showed that there were several determinants with respect to the energy conservation by means of different motivational activities. Some researchers [12] explain that there exist several social and political factors related to energy conservation. Furthermore, they explain that administrative and political issues, firm behavior on different policy instruments and multiple overlapping factors may contribute to the decision on energy conservation [13]. New group of researchers explain that it is difficult to develop, convince and diffuse new policy instruments for different kinds of motivational activities on energy conservation [14].

Researchers have developed some relationship for demand function of electricity as follows [15], [16]

$$\log Y = \log(\beta_1 * P) + \log(\beta_2 * I) + \log(\beta_3 * R) + \log(\beta_4 * B) + \varepsilon \quad (1)$$

Where,
Y = Electricity Demand,
P = Electricity Price,
I = Monthly Income of the consumer,
R = Cost of other commodity (Energy Resources),
B = Consumer behaviors and usage pattern,
β1 = Price Elasticity of Demand,
β2 = Income Elasticity of Demand,
β3 = Cross Price elasticity of Demand,
β4 = Incentive Elasticity of Demand,
ε = Other unknown factors.

Considering the Equation (1), it is found that consumer's behavior (B) effect the energy demand. The other three factors (P), (I) and (R) all related to tariff regimes, technology and demographic variables of individual consumers. These parameters individually and commonly influence the end result. Accordingly, energy conservation can be achieved by means of changing the consumer behavior on their pattern of usage. In order to change the consumer behavior on pattern of usage, different intervention mechanisms have been introduced by CEB in time to time. However, many of such intervention mechanisms have not reach the expected goals as per [6 & 7]. The theory of planned behavior (TPB) has significantly been used for systematically identifying the determinants that influence decision making in various behavioral studies including energy conservation, green consumerism, environmental aspects, etc. as in [17]. Accordingly, electricity consumer's behavior on different antecedents can be measured by using a structured questionnaire as per the guidelines given by TPB mechanism as in [18]. Further, [19] explains in TAM model that new technology also influences the consumer mindset over the usage of electricity in an efficient manner. TAM model also explains the behavior of consumer over different technological inputs by measuring behavior intention rather than looking at the actual behavior at the end. Therefore, both TPB and TAM models help to predict the consumer behavior on different interventions in advanced prior to looking at the end result. However, even though there exists a mechanism to predict the final behavior of electricity consumers during the time of different interventions, this phenomenon has not been utilized properly by Sri Lankan utility on deciding the level of intensity of incentive mechanisms and regulatory frameworks on electricity conservation as per [6] & [7]. Therefore, a gap is identified in the existing body of knowledge and hence this research paper attempts to fill this gap for conservation of energy in Sri Lanka. The theory of planned behavior as stated in [18], behavior is obtained by interaction between motivation which can trigger by means of an incentive scheme, and ability to control. The TPB assumes that intension can directly predict the behavior. Whenever, new technology is introduced to the market, there is certain delay in diffusing same throughout the domain due to the reluctance of consumers to accept the new knowledge. This phenomenon has been fully explained by Technology Acceptance Model (TAM) as per [19]. The conceptual model identified within this study integrates both TPB and TAM models to develop new model which can be used for identifying the level of interventions on changing consumer behavior to conserve electricity in Sri Lanka in a sustainable manner. Therefore, this research study utilize the philosophy of realism, positivism and interpretivism with the use of existing knowledge and inputs given by different consumers during the structured questionnaire survey which is identified as the research strategy. Further, the strategy covers structured questionnaire survey and several interactive face to face interviews with different stakeholders. The new model which is the consolidated and improved extended version of TPB and TAM is used to predict the consumer behavior on different interventions and observes the mediation effect of incentives and regulations on commercial sector.

TABLE I. shows the different consumer segments by tariffs category-wise as given in [1]. Very important observation could be found in TABLE I. with respect to total energy sales in commercial sector especially in general purpose consumers; i.e. the total energy demand 19% in 2013 has risen to 19.7% in year 2015. This is solely due to the increase in consumer number as well as the failure of the intervention mechanisms on energy conservation as explained by [6] & [7]. The effective intervention mechanisms on energy conservation on this sector could adjust the excess usage of energy within the different premises of commercial institutions especially in hotels, government buildings, banks, restaurants, shopping complexes, super market network etc.

Table I :Present situation of consumer base in CEB as given in [1]

Tariff Category	Number of Customers in 2013	Number of Customers in 2015	% Sales in 2013	% Sales in 2015	% to total in 2015
Domestic	4,589,929	4,966,395	33%	33.5%	88.5%
Religious	31,627	34,710			
General Purpose	535,267	588,063	19%	19.7%	10.4%
Industrial	53,162	56,681	32%	30.6%	1.0%
Hotel	465	489	2%	1.8%	0.01%
Government	309	1792	1%	1.2%	0.03%
LECO	1	1	13%	12.3%	Negligible
Street Lamp	1	1		0.9%	Negligible
Total	5,210,761	5,648,132	100%	100%	100%

B. *Research Questions*

Research questions are as follows;

- Why CEB's intervention mechanisms on energy conservation on commercial consumers failed prematurely?
- What is the consumer perception on different intervention mechanisms on commercial sector?
- What is the influence of intervention mechanisms to commercial sector?
- What is the mediating effect of interventions on energy conservation?
- How to derive effective policy mechanism on incentives and regulations on this sector towards conservation of energy?

C. Research Objectives

Based on the above research questions the following research objectives are derived.

- To explore the present situation of different intervention mechanisms available in Sri Lanka on energy conservation.
- To explore the consumer perception on different interventions mechanisms presently available in Sri Lanka.
- To explore the influence of different intervention mechanisms on energy conservation in commercial sector.
- To explore the mediation effect of different interventions mechanisms on energy conservation.
- To develop appropriate scientific model for explaining the behavior of interventions on energy conservation and thereby to derive policy mechanism on interventions towards conservation of energy in commercial sector of Sri Lanka.

II. LITERATURE REVIEW

Many studies have shown that various types of incentives are prevailing to motivate consumers to conserve energy around the world as explained in [6] & [7]. Among them, investment subsidies, loan schemes, tax credits and emission allowances are the most popular incentives. More specific studies explain that the available mandatory regulations and incentive schemes must greatly be cost effective in order them to be implemented by the firms as in [22].

Some researchers have explained that, most intervention mechanisms have not been studied scientifically and comprehensively as in [13], [14] and [23]. Many researchers have pointed out that the intervention is composed of six components; Efficiency criteria, size, recipients, form of incentive, eligibility requirements and whether program has exit criteria or continuing with recycling mechanism as in [24].

Some studies showed that incentives work properly than stringent regulations and therefore, governments need to follow effective incentive mechanisms rather than strict regulations to change the behavior of public as explained by [25]. Furthermore, tariff regimes influence the consumer to conserve energy with different price signals as in [26].
Most intervention mechanisms practice on energy conservation options are the monetary rewards, energy saving technology based products and systems and regulatory regimes as in [27]. It has been found these interventions have failed to reach the desired results owing to the absence of continuous monitoring along with proper regulatory framework as explained in [28].

The barriers and difficulties prevailing against the consumer's decision on investment on energy efficient equipment and changing mindset to use them have been researched by studies [29] & [30].Those studies suggest that technological innovation along insufficient to reduce energy consumption but need the change of behavior too. However, still room is there to motivate consumers by means of incentives and different regulations as explained in [31].

III. METHODOLOGY AND CONCEPTUAL MODEL

Since the literature supports the three major components as the determinants of energy conservation which has real knowledge gap, the conceptual model in Fig. 1 is developed based on the findings from the existing body of knowledge. Integration of TPB and TAM models to explain the behavior of consumers towards energy conservation is depicted in the conceptual model as given in Fig. 1.

In this research, positivism, realism and interpretivism are used as the research philosophy to study electricity consumer behavior with respect to different interventions. Structured questionnaire survey and series of face to face interviews used as the main strategy of the research. Basically, this research is composed of both inductive as well as deductive approaches and hence it is of a mixed method.

The research strategy adopted in this study is that it is started from exploratory method to build up a model to integrate consumer behaviors on different aspects and thereby to measure the performance of the instrument on explanatory means. The mediating effect of incentives and regulations on energy conservation is observed with the principle of observations based on the integrated TPB and TAM models through an inductive research process. Finally, the new model is re-evaluated with collected user observations and thereby the entire research becomes a mixed method. Sample size is determined by the conceptual model and the scientific tool which is being used to analyze the hypothesized model. As per the AMOS software requirements [32], the sample size should be large enough to get at least 10 respondents for one parameter to be estimated in the model. In this context, SEM techniques incorporated with AMOS 25th version software is used to analyze the hypothesized model and accordingly, sample size is determined by the number of parameters in the model. The size of the sample is re-assured with formula which has been accepted by many scholars in recent literature [33]. In this research, sample size is found to be 400 numbers of domestic consumers which create 34 observable indicators of scale category as identified in the structural model as given in the Fig. 2.

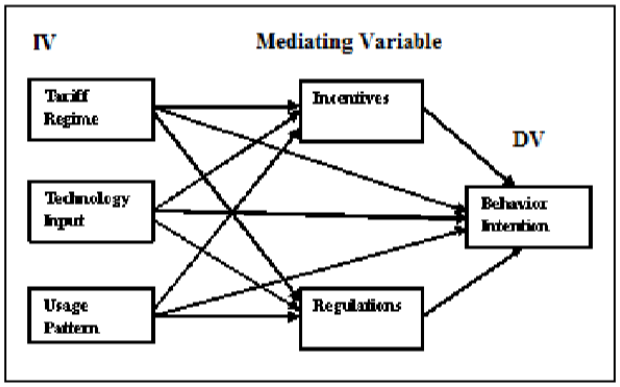

Fig 1: Conceptual Model

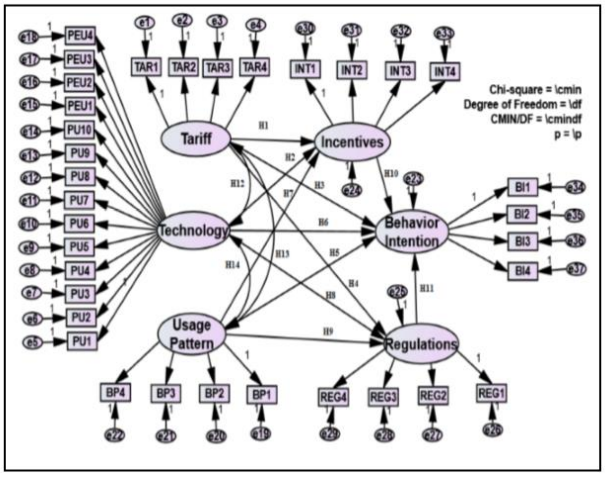

Fig 2: Structural Model

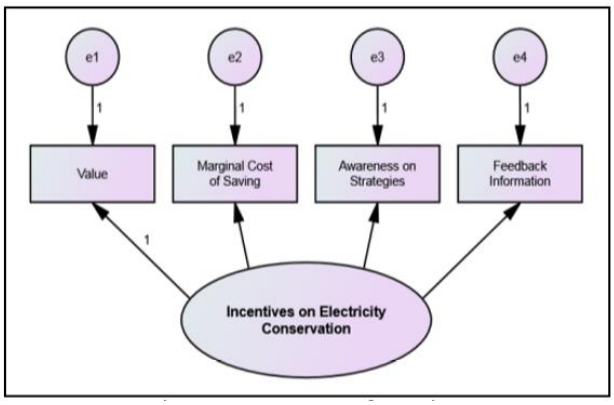

Fig 3: Measurement of Incentives

A. *Measurement of Incentives*

Level of consumer perception on existing incentives is measured using 4 latent variables INT1, INT2, INT3 and INT4 as shown in Fig. 3. Promoting energy conservation behavior among electricity consumers is a challenging task. [34], explains that different incentives on behavioral science, psychology and economics terms could achieve this target. Providing general information on energy saving decreases the electricity demand at least in the short-run [35], explains that although little is known about the effects of mass media campaigns on actual energy use. Environmental education and generating awareness have been viewed as effective interventions [36] (Sardianou, 2007, Linden et al., 2006, Brandon and Lewis, 1999).

B. *Measurement of Regulations*

The regulation on energy conservation is a latent variable which composes several measurable indicators. The consumer perception on different indicators of regulation is measured using a structured questionnaire. In this case, consumer perception of regulations on device type, time of use, amount of usage and pattern of usage, energy star rating of different devices etc. are measured as given in Fig. 4. This is supported by [37]. The measurement of regulation is based on device type, time of use, usage pattern and energy rating.

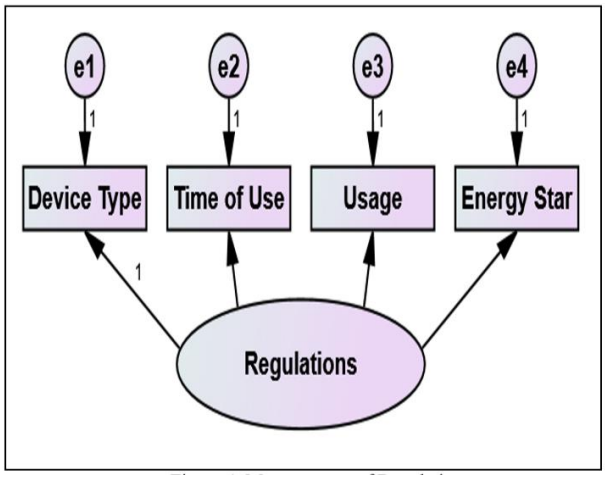

Fig 4: Measurement of Regulations

C. *Measurement of Consumer Perception on Tariff*

Measurement of consumer perception on prevailing tariff is measured using 4 indicators as given in Figure 5. In this case, consumer perception on energy price, whether it promotes the business, whether it preserves the energy security and sustainability of the business etc. are measured. This is supported by [38*]*.

D. *Measurement of Consumer Perception on Technolog*

y This is achieved by TAM model as explained by [19]. In this case, perceived usefulness and perceived ease of use of available technologies on conservation of energy are taken in to account. This is supported by [19].

E. *Measurement of Consumer Perception of Energy usage Pattern*

This is achieved by measuring 4 indicators of usage pattern as described by [39]. Accordingly, entry, spend, exit and awareness on others behavior of individual consumer with respect to electricity usage is measured in order to observe different pattern of consumption. This is depicted in Fig. 6.

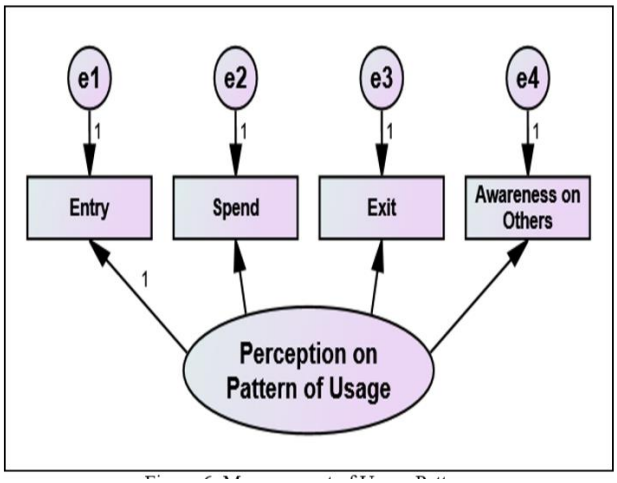

Fig 6: Measurement of Usage Pattern

F. Development of Hypothesis

In order to observe the behavior of mediating variables on different interventions, 14 hypothesis are defined as given below;

H1: There exists positive relationship of tariff and the incentives.

H2: There exists positive relationship of technology and incentives.

H3: There exists positive relationship of tariff and behavior intention of consumers towards energy conservation.

H4: There exists positive relationship of tariff and regulation on energy conservation.

H5: There exists positive relationship of behavior pattern and behavior intention of consumers towards energy conservation.

H6: There exists positive relationship of technology and behavior intention of consumers towards energy conservation.

H7: There exists positive relationship of usage pattern and incentives towards energy conservation.

H8: There exists positive relationship of technology and regulations towards energy conservation.

H9: There exists positive relationship of usage pattern and regulations towards energy conservation.

H10: There exists positive relationship of incentives and behavior intention of consumers towards energy conservation.

H11: There exists positive relationship of regulation and behavior intention of consumers towards energy conservation.

H12: There exists positive correlation among tariff and available technology for energy conservation.

H13: There exists positive correlation among tariff and consumer's usage pattern.

H14: There exists positive correlation among technology and consumer's usage pattern.

In addition to above hypothesis, the mediation effect of incentives and regulations on independent variables and consumer's behavior intention on energy conservation are measured in order to develop a new model on this concept

IV. DATA ANASIS

The data analysis is composed of several major steps involved with AMOS software package. Initially, a hypothesized model is created and accordingly indicators are selected for each and every exogenous and endogenous variable which comprises several latent and observable constructs. The main requirement for deciding the consistency of collected data with respect to the measuring.

instrument. The measuring instrument is decided with the support of literature survey and the fundamentals of the research philosophy and the strategy. In order to measure the latent variables identified within the conceptual framework and subsequently the hypothesized model, 05 point liket scale is used conventionally as per the literature survey. Initially, the mandatory requirements are ascertained prior to proceed with the detail analysis of data. The internal consistency, normality and reliability concerned are observed in detail prior to proceeding with detail data analysis. Then the model fit indexes are studied in order to ascertain whether the collected data fits with the measuring instrument and with the hypothesized model. The several model fit indexes are then studied and confirmed the model fitness. Several validity tests are performed in order to verify whether the questionnaire is replicating the actual characteristics of each indicator. The construct validity tests compose of convergent validity and discriminant validity. Both tests are confirmed the quality of questionnaires which indicates the actual representation of the each and every latent variable. The next step is to do the confirmatory factor analysis based on the initial AMOS output of the hypothesized model. The estimated standardized regression weights are checked with the parameters governed by the literature to ascertain the strength of each variable on the variance of latent factors. The factors having less influence on latent variable are removed from the model and respecified model is then re studied with the AMOS software.

The basic tool used for this study is AMOS 25th version and accordingly Goodness of Fit measures 03 fundamental requirements to be fulfilled in order to consider the observations collected through the research match with the expected parameters in reality. Following 03 parameters are tested in order to verify the goodness of fit of the instrument. Those composed of absolute model fit, incremental model fit and parsimonious model fit.

A. Absolute Model Fit

This parameter measures 03 major characteristics of the instrument. It comprises of Chi Square and probability value, Root Mean Square Error Approximation (RMSEA) value and Goodness of Fit Index (GFI).

In order to have the goodness of fit in the proposed model, Chi-Square value must be reasonably small while p value <0.05 as shown in Fig. 7. The value of RMSEA < 0.08 and GFI < 0.9 as in [40].

It is found that Cronbach's Alpha is above 0.7 and which proved that reliability prevails in the data set as per [41], [42].

All the construct show relatively good fit as illustrated by CMIN/D.f<5 (i.e. 3.389), p Value < 0.05 (i.e. 0.000), GFI >0.9 (i.e.0.819), RMSEA<0.08 (i.e. 0.077) Chi-Square value at 1738.43 (small is better) [42]. When compared incentive schemes on changing behavior pattern of commercial consumers it was found that there is some mediating effect of incentives towards conservation. In general purpose consumers, there exists significant mediating effect of incentives for changing consumer behavior pattern towards energy conservation. It is found that in existing system, Figure 7, the influence on incentives for changing consumer behavior pattern towards energy conservation is insignificant

Parameter	Should be	Value
$\chi 2$	< >	Small
pValue	<=	0.05
RMSEA	<=	0.08

Fig 7: Model Fit Index

For H6, β=0.00, CR=-1.22, pValue=0.262 and hence H6 rejected. For H7, β=-0.052, CR=-1.496 and p Value> 0.05. Value = 0.135) and hence, alternative hypothesis (H7) is rejected. This implies that existing incentive schemes on changing consumer behavior towards energy conservation is in adequate. Similarly on regulation side, β=0.001, CR=0.112 and p Value> 0.05. Value = 0.911) and hence, alternative hypothesis (H9) is rejected. For H12, it is found that, there exists positive correlation between tariff and the available technology. But it is very weak (0.008), hence the technology and the tariff system should be properly matched in order to encourage better use of technology towards conservation. (H14 is also true but it is very weak relationship). The correlation between tariff system and the usage pattern shows negative correlation; H13= (-0.223) hence H13 is rejected. Therefore, it is understood that there is no significant impact of available regulations and incentives on changing consumer behavior towards energy conservation. Accordingly, H6, H7, H9 and H13 have found rejected while H1, H2, H3, H4, H5, H8, H10, H11, H12 and H14 have found accepted. Since the existing system does not support the incentives or regulations towards energy conservation sufficiently, the model is re-specified as given in Figure 8 while removing the variables which are having factor loading below 0.3 as per [42]. The re-specified model is having all the factors greater than 0.3 and giving greater convergence. In this model INT4, TAR1, BI2, PEU1, PEU2, PEU3, PEU4 and REG3 indicators have been removed due to lack of significance. The explanations for removal of certain indicators on re-specified model are as follows;

Table II. Indicator measurements

INT4	No influence of feedback information
TAR1	Existing tariff do not encourage energy conservation
BI2	People do not conserve energy due to its scarce nature
PEU 1-4	No influence on perceived ease of use of new technology on energy conservation
REG3	Existing regulations do not encourage energy conservation

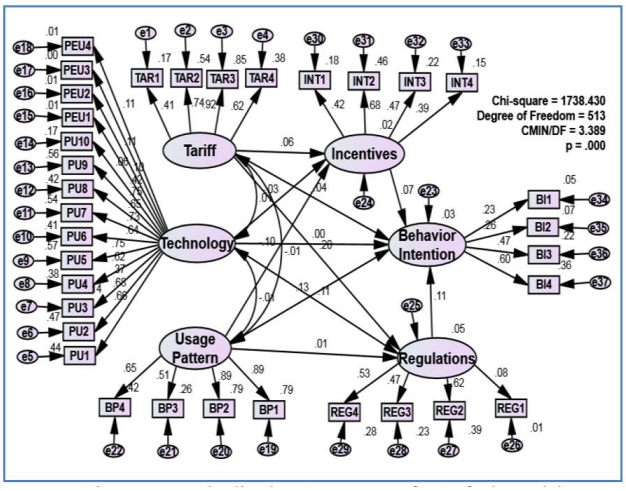

Fig 8: Standardized AMOS Output for Default Model

B. Standardized AMOS Output for Re-Specified Model

The Re-specified model given in the Figure 8 is having Chi-Square value 603.352 and CMIN/DF value 2.102 (2<2.102<5) which is far better than original structural model and hence it is successfully converged with AMOS requirements with GFI=0.896 ≈0.9, RMSEA=0.053 <0.08, TLI=0.839≈0.9, and thereby considered as the scientific instrument which can explain the behavior of dependent variables with respect to independent variables. All the indicators of latent variables are having factor loadings greater than 0.3 and hence it can be confirmed that measurement technique identified by the re-specified model is satisfactory.

C. Testing of Mediation Effect of incentives and Regulations on Energy Conservation

Re-specified model given in the Figure 8 is having ChiSquare value 603.352 and CMIN/DF value 2.102 (2<2.102<5) which is far better than original structural model and hence it is successfully converged with AMOS requirements with GFI=0.896 ≈0.9, RMSEA=0.053 <0.08, TLI=0.839≈0.9, and thereby considered as the scientific instrument which can explain the behavior of dependent variables with respect to independent variables. All the indicators of latent variables are having factor loadings greater than 0.3 and hence it can be confirmed that measurement technique identified by the re-specified model is satisfactory.

D. Testing of Mediation Effect of incentives and Regulations on Energy Conservation

Regression coefficients of re-specified model give the evidence for mediation effect of two interventions of incentives and regulations. Accordingly,

(Tariff – incentives) x (incentives-BI) = Mediation effect of incentives

Mediation effect = 0.26*0.06 = 0.0156 which is greater than direct effect 0.01 and hence there exists mediation effect of incentives on tariff and the energy conservation.Similarly, there exists mediation effect of incentives on technology and energy conservation. (The regression coefficient between technology and the behavior intention on energy conservation is zero as per the Figure 7). However, when referred to Figure 7, it is found that mediation effect created by regulation is less than the direct effect between consumer usage pattern and the behavior intention on energy conservation.

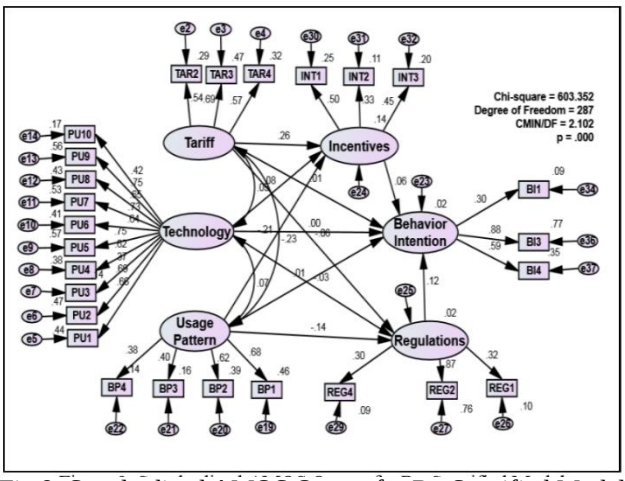

Fig 9: Standardized AMOS Output for Re-Specified Model

Therefore, in present system there is no mediation effect of regulation on changing the consumer mindset over the energy conservation. Similarly, there is no mediation effect of regulation on existing tariff towards energy conservation. Further, it is found that mediation effect of incentives on changing consumer behavior pattern is greater than the direct of consumer's behavior pattern on energy conservation. Therefore, it is confirmed that incentives mediate to change the consumer's usage pattern towards the conservation.

V. FINDINGS & CONCLUSIONS

This research study basically focused on achieving 05 objectives.

A. Research Question1

Why CEB's intervention mechanisms on energy conservation failed prematurely?

It is because of ineffectiveness of current interventions namely incentives and regulations, only the incentives mediate to change the consumer mindset on energy conservation. But, research found that influence is very low. β=0.06, R^2=0.0036 and hence, existing incentive mechanism is ineffective. Also in regulations, β=0.11, R^2=0.0121 and hence, existing regulations are somewhat better than incentives on the verge of energy conservations. However, still improvements are necessary.

B. Research Question 2

What is the consumer perception on different intervention mechanisms?

Observing the Figure 7, it is found that consumer perception of incentives is below 0.5 for all three indicators.For regulations, consumer perception is at 0.87 only for REG2 indicator which is the device type option. Other two indicators are just above 0.3. REG2 is the regulation imposed by PUCSL (which is the Public Utility Commission of Sri Lanka) on the use of different types of fittings and bulbs etc. for illuminations, heating and ventilations. However, that is also not followed by the consumers effectively in many situations.

C. Research Question 3

What is the effect of intervention mechanisms available to commercial sector?

Even though, two intervention mechanisms have been identified for this sector, incentives have poor contribution as β=0.06, and

R^2=0.0036 compared to regulations, β=0.11, R^2=0.0121 which is at little bit satisfactory level.

D. Research Question 4

What is the mediating effect of different intervention mechanisms towards conservation of energy?

It is found that only the incentives create mediation on energy conservation which has to be encouraged in present context. The mediation effect of regulation on energy conservation with respect to present context is very poor. Therefore, the stringent regulations are needed to create an

impact on the consumer mindset towards conservation of energy.

E. Research Question 5

How to derive a scientific model and a policy instrument on this context for the sustainable conservation of energy?

Since the SEM model created using AMOS software converges satisfactorily, same can be used as the scientific tool for this exercise. In order to explain the behavior of individual component pertaining to the energy conservation different inputs can be tested with this model. If the model converges successfully, then that option can be preceded for implementation. Accordingly, with the use of this model, different level of interventions of individual components on consumer behavior intention can be measured. For example, three indicators of incentives, namely; value of incentive, marginal benefit of the incentive or awareness program on the incentive scheme can be changed individually or simultaneously to see the variation of impact on the behavior intention of the consumer. Similarly, this could be applied to the regulations as well. The developed model can be considered as the basic scientific instrument to measure the behavior of each and every component with respect to the energy conservation and the findings itself will form the policy requirement to enhance the present level of energy conservation of this sector.

VI. LIMITATION AND AGENDA FOR FUTURE RESEARCH

This research covers only the commercial segment of the Western Province (Colombo, Kalutara and Gampaha districts) in the country. This can be extended to other segments of electricity consumers as well. Further, the economics aspects and exit mechanism on these interventions are good agenda for further research.

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