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CRM Index Development and Validation in Indian Telecom Sector

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Abstract: The aim of this study is to develop a reliable and valid CRM (Customer Relationship Management) index specifically catering to Indian telecom sector. An exhaustive review of literature on CRM was followed by depth interview and questionnaire survey. The exploratory factor analysis, confirmatory factor analysis and structural equation modelling followed by case based method are used for development of CRM index along with the customer and service provider weights. The structural model shows CRM in Indian telecom sector as a multidimensional construct comprising of factors namely competitiveness and reliability, support features, relationship quality, transmission quality, technological edge and reputation. Based on these factors, the researchers have proposed the CRM index. The proposed index will help in identifying issues that contribute to CRM in Indian telecom sector and thereby formulating strategies accordingly, resulting in efficient (in terms of cost) and effective (outcomes) CRM practices. A fair amount of literature on Indian telecom sector dealt with identifying factors explaining the constructs of quality, value or satisfaction. But there is paucity of research pertaining to industry specific CRM index development and validation. This study is an attempt to bridge this gap in the existing literature.

Key words: CRM scale, CRM index, Indian telecom sector, exploratory factor analysis, confirmatory factor analysis, structural equation modelling

INTRODUCTION

In the prevailing competitive scenario engulfing the world today, organizations are increasingly facing intense pressure to excel or even survive. Even the common people from all walks of life and from all the corners of the globe have been struggling hard to keep pace and stay in fray in such a fierce environment. The industrial scenario is no different. Corporate executives have been working overtime to achieve business excellence by striving to find solutions to those problems which have often plagued their counterparts in other parts of the globe. The message is amply clear: the gospel of globalisation has come to occupy centre stage.

The initial focus on price which had dominated the competition before has now shifted to both price and quality. Today, customers are more powerful than ever before and are demanding quality in products, services and also in their life. They have also become increasingly discerning and have started looking for options more in tune with their basic needs requirements and self-esteem. Today, customers are demanding quality in services and are prepared to even pay a premium for getting a better quality product or service. In the business world today, one of the biggest challenges is customer retention. Increasing competition for more consumers has led companies to refine or provide extra value to services that they provide in order to differentiate themselves from their competitors. According to a study conducted by the Institute of Environmental Research (IER), only 4% of unsatisfied customers will actually complain about poor service but of the 96% who do not complain 90% will not continue doing business with that organization. Even more important is the fact that each dissatisfied customer will tell at least seven other people about his/her experience (Rintjema, 1998).

Telecom sector around the globe has been recognised as one of the prime support services for rapid growth and modernisation and a key tool for ensuring socio economic development. Over the last decade technological improvements and globalisation has led to the creation of a very dynamic trading environment providing many potential opportunities but hidden risks for telecom companies (Arvaiora *et al*., 2009). Management approaches and techniques have emerged to guide companies to achieve sustainable growth and yet remain competitive. Companies involved in the telecommunication sector are operating in an environment

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which is characterised by an extremely accelerated growth pattern both in terms of technological improvement and economic performance.

Studies investigating the expansion of the telecommunications sector and its convergence with broadcasting and IT industries in the late 1990's tend to employ various approaches such as the analysis of the vertical structure of the industry and competition (Krafft, 2003) and the examination of performance shifts through changes in an organization, regulation, technologies and markets, the former focuses on industry evolution whilst the latter mainly concentrates on changes in interface standards and other capabilities connecting various operating activities (Ulset, 2007). The two approaches are analogous with the theories of competitive v/s. resource based strategies where the former takes into account the companies external environment while the latter builds on their internal capabilities (Adner and Zemsky, 2006). Indian telecom sector has undergone a major transformation through strategic policy reforms over the last decade (Oberoi and Sagar, 2009). The transformation era started with the formulation of National Telecom Policy in 1994. Indian government adopted a phased approach for reforming the telecom sector. It played a proactive and positive role in developing the telecom sector and encouraged both public and private players to contribute in its development.

India has emerged as one of the fastest growing economies in the world with spending on infrastructure and consumption growing at a rapid pace. Telecommunications is part of the basic infrastructure needed for the expansion and development of a national economy and is therefore rightly recognised as a catalyst for competitiveness and investment. The Indian telecommunications industry is abundant with exciting possibilities (Sagar *et al*., 2009). It is the world's second largest market after China in terms of wireless connections (Government of India, 2010). This success can be attributed to the regulatory strategy of encouraging the private players and maintaining a competitive environment. Exponential growth has been witnessed in the number of wireless subscribers. In June 2010, the total subscribers (wireless wireline) being 671.9 million resulting in a teledensity of 56.83%. The urban teledensity crossing the 100% mark (128.2%) while the rural teledensity being 26.43%.

Since, telecom service providers thrust towards acquiring more and more customers under their umbrella the quality of services delivered by the telecom service providers to their customers is bound to suffer. There are challenges for optimal usage of the resources and to bring the services within the reach of common populace at affordable prices. Moreover, the telecom industry by virtue of highly customer centric in its operations provides enough scope to coalesce and represent most of the critical factors of customer-perceived service quality and the critical dimensions of CRM that management may have to face in order to manage a service organization effectively. In the light of these changing dynamics and in the researchers view if a holistic approach be followed which involves people, process and technology the profit of the Indian telecoms service provider can jump leaps and bounds. This discussion forms the cornerstone for laying down the primary objective of this research which lies in developing a CRM index from the Indian telecom customer's perspective for facilitating its effective implementation in Indian telecom sector.

LITERATURE REVIEW

India's telecommunication network is the third largest in the world and the second largest among the emerging economies of Asia. The telecom sector has reinforced the economic growth wave of the country. However, despite this tremendous growth rate and immense potential as is evident from the above vital statistics, a glaring question which confronts this vastly grown industry lies in the capability of the Indian telecom service providers to aggressively satisfy the needs of their customers without compromising on quality aspect. This assumes great significance in the light of the fact that in the Indian telecom market the consumer is the king and more importantly he seems to know that. In India today, every telecom circle has about 10 mobile service providers. The market share has already been captured by the incumbents and the new operators are trying to create both a mind share as well as a market share and hence are offering innovative services and plans at reduced tariffs (Oberoi and Sagar, 2009). Table 1 briefly shows the select list of studies carried out in last decade.

According to the researchers, CRM is a business strategy designed to optimize customer satisfaction, revenue and profitability by organizing the enterprise around customer segments, fostering customer-centric behaviors and implementing customer centric processes. CRM driven business process focuses on understanding customers and accordingly customizing services delivered to the clients. The most important aspect of CRM is that customer feels a strong connection with organization while availing psychological and functional benefits that result in positive relationships, increasing customer loyalty and expanding customer lifetime value (Ahn *et al*., 2003; Brassington *et al*., 2010). Different researchers have supported the view of measuring

Table 1: A select list of studies in telecom sector

Researchers	About the study
Gerpott *et al.* (2000)	The researchers have used SEM approach and found that customer retention, loyalty and satis faction are important goals for the telecommunications operators in the german mobile tele communications market. Results also indicated that network quality, price assessment and personal benefits had positive and significant effect on customer satisfaction. Mobile service price, personal service benefit perceptions and number portability had the strongest effects on customer retention as well
Leisen and Vance (2001)	The researchers have done a study in context of fixed line telephone services and found SERVQUAL instrument to be the best fitting model of telephone service quality in US and Germany
Johnson and Sirikit (2002)	The researchers have conducted their study on both landline and mobile users of Thai telecommunication industry using the service quality dimensions (reliability, responsiveness, assurance, empathy and tangibles). Tangibles emerged as the most important factor but no significant link was found between the service quality ratings and the customer's behavioural intentions
Wang and Lo (2002)	The researchers have investigated the impact of quality-related factors on customer value and customer satisfaction using SEM in China. They used the SERVQUAL (Parasuraman *et al.*, 1988) factors to measure service quality but added network quality as another antecedent of customers perceived service quality. Results indicated that all the service quality factors had significant and positive impact on customer satisfaction. Customer perceived value had a moderating effect on the service quality and customer satisfaction link
Athanassopoulos and Anastasiosiliakopoulos (2003)	The researchers have conducted the study on residential customers of a European telecomm unication company revealed that customer perceived performance (i.e., satisfaction, recom mendation to others, relationship and value for money) were affected by product performance, satisfaction, directory enquiries, branch network, billing and corporate image
Ranaweera and Neely (2003)	The researchers have done a study in context of fixed line telephone services by using SERVPERF with some modifications for service quality measurement. Study revealed that price perceptions and indifference moderated the relationship between service quality and customer retention
Kim *et al.* (2004)	The researchers have investigated the effect of different service features and switching barriers on customer satisfaction and customer loyalty in the Korean mobile telecommunication services sector. They used SEM to test their proposed structural model. The results indicated that customer satisfaction is significantly and positively affected by call quality, value added services and customer. Findings also indicate that customer satisfaction and switching barrier had a significant and positive impact on customer loyalty
Aydin and Ozer (2005)	The researchers have used SEM to study the impact of service quality, perceived value, customer expectations and complaint handling on customer satisfaction in the Turkish mobile telephone market. The results showed that service quality, customer expectations and complaint handling had positive and significant effect on customer satisfaction. Service quality had the strongest effect than other constructs in their model. All these studies have looked at different facets of service quality or service features affecting customer satisfaction thereby precipitating the need for considering the service-related factors in the Indian mobile telecommunications sector and identifying the customer value drivers
Turel and Serenko (2006)	In this study, the researchers have empirically investigated customer satisfaction with mobile services in Canada. They adapted the American Customer Satisfaction Model to identify the antecedents and consequences of customer satisfaction for young cellular subscribers and also developed and estimated a model using a PLS (Partial Least Square) path modelling developed by Chin (2001). The results indicated that perceived service quality and perceived value are the key constructs affecting the customer's satisfaction with mobile services. Satisfaction in turn leads to customer loyalty
Lai *et al.* (2007)	The researchers have tested the SERVQUAL model in China's mobile communication industry and found that the SERVQUAL instrument is a valid means for measuring service quality. They also identified service convenience as an important additional dimension of service quality in China's mobile services sector
Wang and Feng (2008)	Scale for assessing CRM capability in service industries in China
Arvaiova *et al.* (2009)	The researchers identified the costs of quality programmes in the UK telecommunications industry. The findings revealed little interest in implementing such programmes in this sector. The main reasons for this are having a costing system already in place that is capable of monitoring quality costs and not yet introduced to the concept of CoQ

effectiveness of CRM process based on metrics that are customer centric and give managers a better idea of how their CRM policies and programs are performing. Three stage model of CRM explains how customer relationships can be managed, acquiring customers via clear communication of a powerful value proposition, retaining them by delivering good service and finally extending relationship through the delivery of tailored services to clearly defined customer segments (Chaffy, 2003). One of the previous studies has defined CRM effectiveness (CRME) as process-oriented construct that centers on intersection of three elements IT, relationship marketing and organizational climate (Chen *et al.*, 2009). Understanding the expectations and needs of customers and offering value-added services are recognised as factors that determine the success or failure of companies. Researchers have pointed out that CRM principally revolves around marketing and begins with a deep analysis of customer behaviour (Kotler, 1997). Thus the underlying concept of CRM revolves around the idea of satisfying customer expectations leading to customer retention and hence organization's profitability (Ahn *et al.*, 2003; Reinartz and Kumar, 2003; Heskett, 2002; Brassington *et al.*, 2010).

The proven positive relationship of service quality with customer satisfaction (Leisen and Vance, 2001; Danaher and Gallagher, 1997), customer retention and loyalty (Ranaweera and Neely, 2003) profitability (Bloemer *et al.*, 1999) and competitive advantage (Hampton, 1993) provides a base to explore the subject in the cellular mobile context. Previous studies in this area primarily focused on functional quality aspects (i.e., pertaining to service delivery process or how the services are delivered) and inadequately addressed technical

quality aspects (i.e., issues concerning what is actually delivered). However, some of the researchers (Johnson and Sirikit, 2002; Wang and Lo, 2002) have emphasized that technical quality attributes play an important role in forming service quality perceptions of customers. Previous researchers have categorised mobile telephony quality measurement dimensions identified as mobile device, network coverage, value-added services, convenience, price structure and billing system (Chao *et al*., 2007). Also delivering superior customer value has become an ongoing concern in building and sustaining competitive advantage by driving CRM performance. The low switching cost has been used as influential trigger (Roos *et al*., 2004) in telecom sector resulting in competitive pricing among the players. This led to a situation of cut throat and thereby enhancing the scope customer satisfaction and hence the loyalty (Johnson and Gustafsson, 2000; Johnson *et al*., 2001).

The technological advancement has led to introduction of new and more advanced technologies like 4G, 3G Wi MAX and the integration of relatively new services like mobile e-mail, GPRS and video camera too has created demand for mobile phones around the world (RNCOS, 2008). The customers now-a-days shows a greater urge to hi-tech products which only highlight his/her preference for advancement in life style and faster accessibility of informational sources. The companies are thus using the power of CRM to streamline operations and increase competitive agility. The researchers have reviewed tools of data mining for effective CRM implementation (Ranjan and Bhatnagar, 2008). Especially promising for CRM purposes is the potential established by the integration of electronic media and database technologies for creating unique and personalised communication with individual customers (Schultz and Bailey, 2000; Peltier *et al*., 2003). Formulating CRM strategies can also increase customer value and enhance customer satisfaction by creating create valuable marketing opportunities in the pursuit of business excellence (Lin and Su, 2003).

Thus, during the early period of evolution of CRM the prime issue of focus for the researchers were advantages of implementing CRM and formulating relationship oriented business strategies but today when every organization is playing with the same approach its very much crucial to develop insight in implementing CRM systems and formulating strategies. This can be done by more refined study of the dedicated industry and identifying the core issues that influences the customer decision making process and hence satisfaction. Finally, these issues will help in developing CRM based systems dedicated to particular industry rather than being generalised. It is reported that 60-70% of CRM programs have resulted in either losses or no bottom line improvement in company performance (Barnes, 2001; Dyche, 2002). A large number of CRM failures are attributed to use of misleading metrics or attaching significance to wrong measures (Paracha and Bulusu, 2002). Earlier different models and scales (Sin *et al*., 2005; Scott *et al*., 2008; Wang and Feng, 2008; Chen *et al*., 2009) have been proposed to measure the effectiveness of CRM practices in an organization. These models are more generalised one and fits to the structure of service industry. Although, these models provide a good background for research but each industry has certain characteristics that are abstracted from generalised one here exists the gap. These models failed to address issues related to these characteristics which contribute to the core competencies of that industry and hence resulted in inefficient estimate. The current research aims to develop CRM index dedicated to telecom industry that focuses on industry specific abstracted characteristics along with the generalised one and hence derive efficient result in evaluating CRM strategies specifically catering to this industry.

MATERIALS AND METHODS

For this study, researchers initially developed 102 scale items derived from 187 research studies mentioned earlier for identifying CRM constructs from relevant literature review and those scale items were taken which are having the minimum of 5 citations; after this a total of 76 scale items retained initially this was followed by depth interviews with the customers of different telecom service providers all across India.

Depth interview: Depth interview was conducted with 23 high valued customers, i.e., customers having high lifetime value (customers were randomly selected form the telecom service providers transaction database who are having the relationship duration of >3 years) of different telecom service providers all across India. The duration of depth interview varied anywhere between 10-20 min. A list containing 76 dimensions extracted from the literature review is given to interviewee along with a brief description of each dimension. Based on the results of the depth interview, the questionnaire is modified.

Key findings of depth interview: The researchers provided a list of 76 dimensions obtained to the interviewees. They were asked to list down the ones they feel relevant to the telecom sector. They were also told to include the

dimensions other than the 76 dimensions provided to them in the list. After getting their responses the list was pruned to 52 based on modal values (15). Findings of depth interview shows, 95% of the respondents were aware of all the telecom service providers operating in their region. The major issues identified were related to network, coverage, technological infrastructure, unable to make call during peak hours, security, privacy, personalisation, customer support and services and image in the market place.

Questionnaire survey: The modified questionnaire is based on these 52 dimensions followed by a pilot survey of the questionnaire to assess the content validity. Content validity can be evaluated by a panel of persons, sometimes experts who judge whether a scale logically appears to accurately reflect what it purports to measure (Zikmund *et al*., 2010). From the result of the pilot survey 16 dimensions are removed as a result, the revised questionnaire contained 36 dimensions (survey items). The revised questionnaire structure comprises of:

Section 1: Demographic information of the respondents
Section 2: Items measuring the respondent's perceptions on specific characteristics of telecom services and overall telecom services quality

The respondents were requested to select the response that best indicates their experiences or perceptions on each statement, using a five point Likert-type scale (From 1 = strongly disagree to 5 = strongly agree).

Key findings of questionnaire survey: Responses to the revised questionnaire were received through online as well as offline from the respondents all across India. The respondents of this study were the customers of different telecom service providers all across India and were selected randomly from the database provided by telecom service providers.

All the customers have at least one personal cellular connection and majority of them are availing value added services as indicated from the database which indicates the suitability and representativeness of the population as a whole. A total of 396 responses were received. Furthermore, the reliability analysis, sampling adequacy analysis and exploratory factor analysis was carried out with the first half of the data (Sample size: 198) to identify the major constructs, subsequently confirmatory factor analysis was carried out with the second half of the data (Sample size: 198) to confirm the factor structure as well as to provide evidence of scale reliability, dimensionality and validity and finally the structural equation modelling was carried out to validate the results. SPSS-15 and AMOS-7 software were used for carrying out statistical analysis mentioned before. The demographic profile of the respondents is shown in Table 2.

Table 2: Demographic profile of the respondents (field survey)

Demographic criteria	Respondents	Percentage
Gender	Male	68.18
	Female	31.82
Age (years)	Between 18-30	28.28
	Between 30-45	58.34
	>45	13.38
Marital status	Single	67.43
	Married	32.57
Education level	Undergraduate	17.92
	Graduate	54.05
	Post graduate and above	28.03
Monthly salary	<20,000 Rs.	28.03
	20,000-30,000 Rs.	33.58
	>30,000 Rs.	38.39
Association with service provider	<1 year	27.02
	Between 1-3 years	45.20
	>3 years	27.78
Service provider	Vodafone	23.48
	Reliance	19.44
	BSNL	15.90
	Airtel	13.13
	Tata indicom	11.87
	Idea	9.35
	Aircel	5.06
	Virgin	1.77

RESULTS AND DISCUSSION

The reliability of the data is checked by calculating Cronbach-α value which is found 0.953 for the total dataset. The calculated value is in the quite acceptable range (>0.7) (Nunnally, 1978). Further to this Kaiser Mayer Oklin statistics is calculated for checking the sampling adequacy, the calculated value is 0.922 (>0.5) which is found quite suitable for carrying out exploratory factor analysis. Exploratory factor analysis was carried out and based on the rotated component matrix a total of 6 factors were extracted along with 31 indicators contributing towards 62% of the variance. Based on these factors, the researchers have proposed the CRM models. The extracted factors along with their indicators are shown in Table 3.

In the first model (Fig. 1), CRM is represented as a uni dimensional construct and all the extracted dimensions from the factor analysis are leading to CRM. This model is verified through confirmatory factor analysis by using the second half of the data (Sample size: 198). This model is discarded because of poor fit based on the calculated absolute measures, incremental fit measures and parsimonious fit measures. The calculated statistics of these measures is shown in Table 4. In the second model

Table 3: Exploratory factor analysis (Rotated component matrix)

	Component					
Factors	CR	SF	RQ	TQ	TE	RE
CR1: Reciprocity	0.603	-	-	-	-	-
CR2: Competitive prices	0.603	-	-	-	-	-
CR3: Interdependence	0.520	-	-	-	-	-
CR4: Variety of price plans	0.648	-	-	-	-	-
CR5: Bonds	0.663	-	-	-	-	-
CR6: Host of value added services	0.660	-	-	-	-	-
CR7: Privacy and security	0.694	-	-	-	-	-
CR8: Honesty	0.710	-	-	-	-	-
CR9: Benevolence	0.558	-	-	-	-	-
CR10: Shared values	0.622	-	-	-	-	-
SF1: Multiple channels of customer interaction	-	0.758	-	-	-	-
SF2: More appealing physical facilities	-	0.694	-	-	-	-
SF3: Responsiveness	-	0.653	-	-	-	-
SF4: Regular feedback mechanism	-	0.573	-	-	-	-
SF5: Assurance	-	0.606	-	-	-	-
SF6: Convenient operating hours	-	0.546	-	-	-	-
RQ1: Competent employees	-	-	0.706	-	-	-
RQ2: Courteous employees	-	-	0.755	-	-	-
RQ3: Approachable employees	-	-	0.673	-	-	-
RQ4: Fart fault repair/ service recovery	-	-	0.582	-	-	-
RQ5: Personalisation	-	-	0.656	-	-	-
TQ1: Updated supporting infrastructure	-	-	-	0.568	-	-
TQ2: Network quality	-	-	-	0.780	-	-
TQ3: Voice quality	-	-	-	0.716	-	-
TQ4: Call quality	-	-	-	0.504	-	-
TQ5: Coverage	-	-	-	0.748	-	-
TE1: Effective information analysis system	-	-	-	-	0.677	-
TE2: Seamless/hassle free integration/implementation of latest software being used	-	-	-	-	0.736	-
TE3: Online availability of various schemes, services and forms	-	-	-	-	0.513	-
RE1: Goodwill and image in the marketplace	-	-	-	-	-	0.736
RE2: Quality assurance system	-	-	-	-	-	0.627

CR: Competitiveness and Reliability, SF: Support Features, RQ: Relational Quality, TQ: Transmission Quality, TE: Technological Edge, RE: Reputation

(Fig. 2) CRM is represented as a multi-dimensional construct explained by the six factors extracted through exploratory factor analysis. This measurement model is verified through confirmatory factor analysis by using the second half of the data (Sample size: 198).

This model is accepted because of much improved level of fit as compared to model-1 based on the calculated absolute measures, incremental fit measures and parsimonious fit measures. A total of 10 indicators namely; CR1, CR3, CR5, CR8, CR10, SF2, SF4, RQ3, TQ1 and TQ3 of the unidimensional construct (Fig. 1) were eliminated in this model (Fig. 2) because of poor loadings (<0.5). The comparative calculated statistics of these measures are shown in Table 2. The measurement model indicated an acceptable model fit of the data (χ^2 = 325.88, df = 174, p<0.05; χ^2/df = 1.87; GFI = 0.87; AGFI = 0.83; CFI = 0.93; TLI = 0.91; PCFI = 0.77 and RMSEA = 0.06) (Anderson and Gerbing, 1988). In addition to this all the indicators loaded significantly on the corresponding latent constructs. The values of the fit indices indicate a reasonable fit of the measurement model with the sample data (Byrne, 2001).

Table 5 clearly indicates that the composite reliability of all the constructs is >0.6 which is fairly acceptable and is one of the criteria to assess reliability of the proposed constructs (Carmines and Zeller, 1988). Construct validity is established in this study by establishing the content, convergent and discriminant validity. Content validity is verified through existing literature and expert's interaction in the area of CRM. Convergent validity is assessed by examining the average variance extracted and factor loadings (Fornell and Larcker, 1981). All the indicators have shown significant loadings onto their respective latent constructs with values varying in between 0.62-0.85. In addition, the Average Variance Extracted (AVE) for each construct is greater than or equal to 0.50 which further supports the convergent validity of the constructs. As suggested by Fornell and Larcker (1981), the discriminant validity can be assessed by comparing the Average Variance Extracted (AVE) with the corresponding inter-construct squared correlation estimates. AVE values were found more than the square of the inter-construct correlations. Thus, the measurement model reflects good construct validity and desirable psychometric properties (Ganguli and Roy, 2011).

In the third model (Fig. 3), the structural CRM model is validated by using structural equation modelling. The calculated statistics of absolute measures, incremental fit measures and parsimonious fit measures is shown in Table 6. The structural model indicated an acceptable model fit of the data (χ^2 = 349.51, df = 183, p<0.05; χ^2/df = 1.91; GFI = 0.86; AGFI = 0.82; CFI = 0.92; TLI = 0.91; PCFI = 0.80 and RMSEA = 0.06) (Anderson and Gerbing, 1988). In addition to this all the indicators loaded significantly on the corresponding latent constructs. The values of the fit indices indicate a reasonable fit of the structural model with the sample data (Byrne, 2001). In short, the structural model confirms the six-factor structure of customer relationship management.

CRM index development using the case based method: The study includes the validation of CRM scale through a case based method and development of CRM index along with the customer

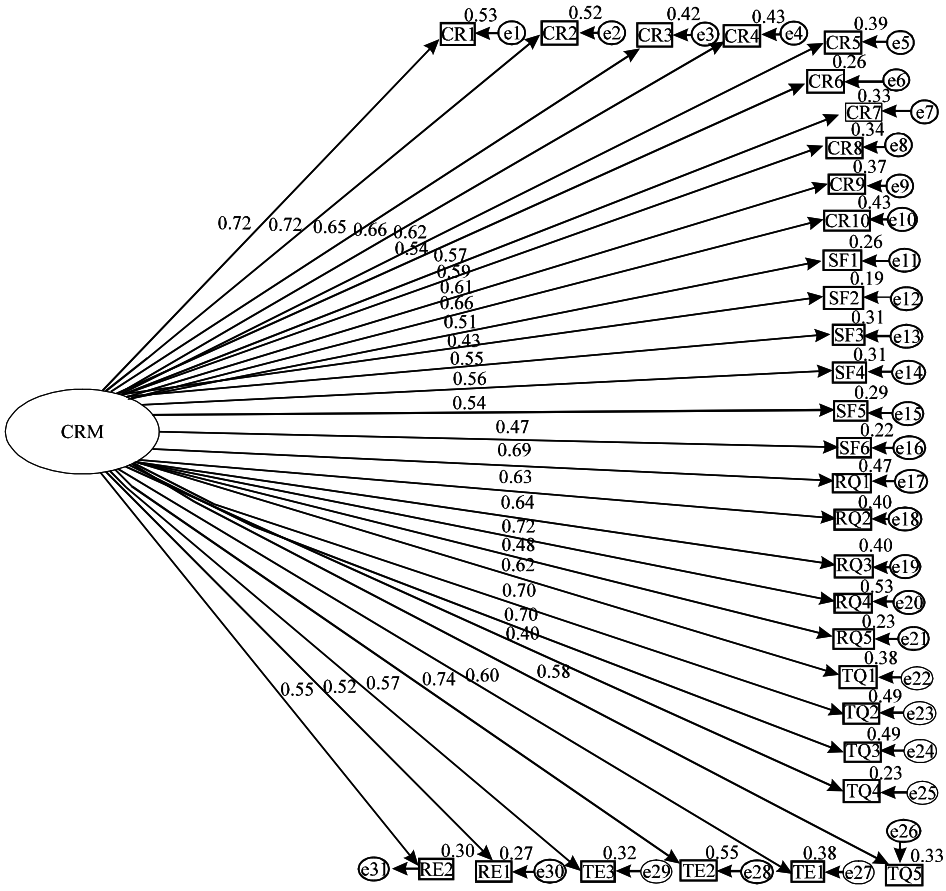

Fig. 1: Model 1; CRM as an unidimensional construct

Table 4: Comparison of the calculated statistics of the models

	Model fit		Absolute measures			Incremental fit measures		Parsimonious fit measures	
Models	χ^2	χ^2/df	RMR	GFI	AGFI	CFI	TLI	PCFI	RMSEA
1	1435.78	3.31	0.06	0.61	0.55	0.70	0.67	0.65	0.11
2	325.88	1.87	0.04	0.87	0.83	0.93	0.91	0.77	0.06

and service provider weights with the help of questionnaire design and survey conducted.

CRM index derivation
Steps:

- Identification of factors leading to CRM (Section 2: empirically validated factors along with their indicators)
- 21 indicators
- Questionnaire development
- Survey
- Respondents score
- Calculation of weights (customers as well as service provider's perspective)
- Development of CRM index (customers as well as service provider's perspective)
- Gap analysis

Questionnaire design: The questionnaire structure comprises of:

Section 1: Demographic information of the respondents.

Section 2: Total 21 items measuring the respondent's perceptions on specific characteristics of telecom services.

The respondents were requested to select the response that best indicates their experiences or perceptions on each statement, using a 5-point Likert type scale (From 1 = strongly disagree to 5 = strongly agree).

Sample selection: For generation of weights for CRM index, the researcher has used non-probability sampling. A judgement sample (Deming, 1960) is selected on the basis of the judgement of the researcher. The customers

were selected on the basis of their understanding and experience with the CRM practices in the telecom houses. A total of 117 and 163 responses were received from the customers of public and private sector telecom houses, respectively. Whereas 15 and 19 responses were received from the marketing, public relation officers and top management officials of public and private telecom service providers, respectively. Public sector telecom service provider: BSNL; Private sector telecom service provider: Bharti Airtel.

Table 5: Composite reliability of the constructs

Construct	Composite reliability
CR	0.88
SF	0.83
RQ	0.88
TQ	0.83
TE	0.83
RE	0.81

Mathematical model for ranking: CRM index can be evaluated with the help of the following mathematical model:

$$\text{CRM index} = \left(W_{A1} * SA + \ldots\ldots\ldots + W_{A6} * S_{A6} \right)$$

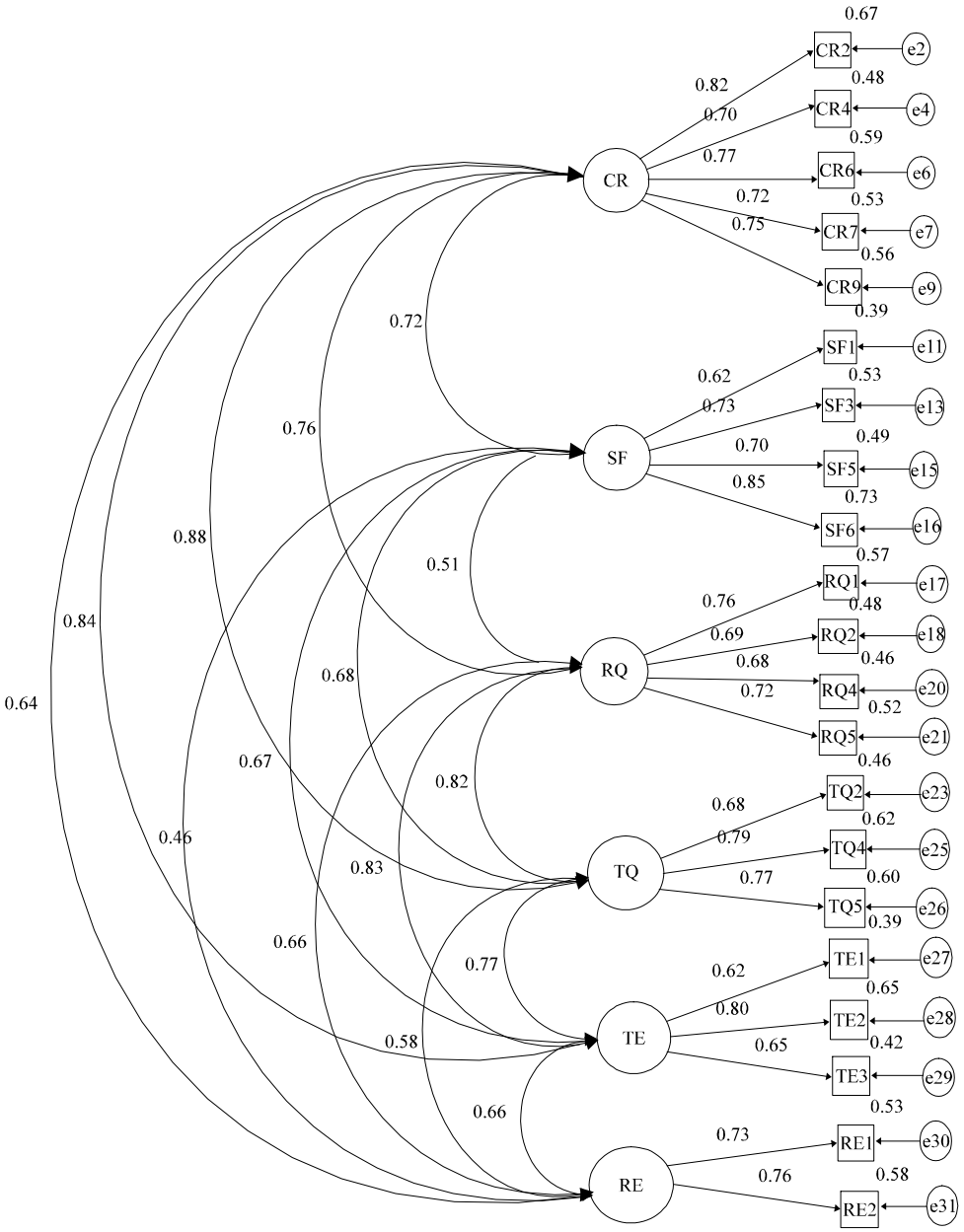

Fig. 2: Model 2; measurement model (6 factor model)

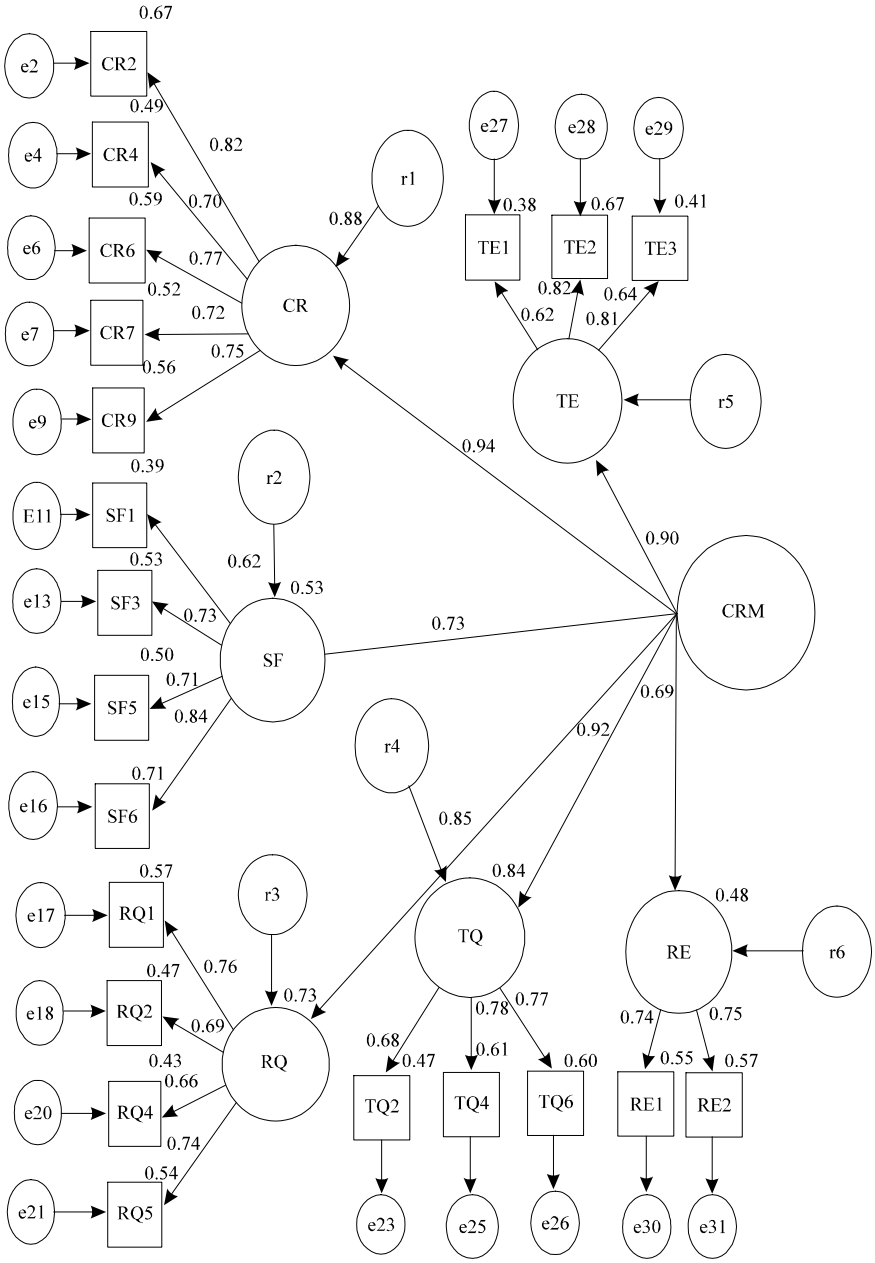

Fig. 3: Model 3; stractural model

Table 6: Calculated statistics of Model 3

	Model fit		Absolute measures			Incremental fit measures		Parsimonious fit measures	
Model	χ^2	χ^2/df	RMR	GFI	AGFI	CFI	TLI	PCFI	RMSEA
Model 3	3349.51	1.91	0.04	0.86	0.82	0.92	0.91	0.80	0.06

Table 7: Demographic profile of the respondents (Customers of public and private sector telecom houses)

Demographic criteria	Respondents	Public sector telecom house (%)	Private sector telecom house (%)
Gender	Male	53.85	57.06
	Female	46.15	42.94
Age (years)	Between 18-30	43.59	38.04
	Between 30-45	41.88	36.19
	>45	14.53	25.77

Table 7: Continue

Demographic criteria	Respondents	Public sector telecom house (%)	Private sector telecom house (%)
Marital status	Single	34.19	36.19
	Married	65.81	63.81
Education level	Undergraduate	26.49	26.38
	Graduate	51.28	50.93
	Post graduate and above	22.23	22.69
Monthly salary	<20,000 Rs.	31.63	39.26
	20,000-30,000 Rs.	51.28	42.95
	>30,000 Rs.	17.09	17.79
Association	<1 year	-	-
with the telecom	Between 1-3 years	57.26	61.35
house	<3 years	42.74	38.65

Where:

W_{A1}-W_{A5} = The calculated weights for the CRM constructs

S_{A1}-S_{A5} = The scores corresponding to the CRM constructs

Data analysis: A sample size of 117 and 163 responses and 21 questions led to a total of 2457 and 3423 data points which are actually the preferences of the customers of public sector and private sector telecom service providers.

The comparison matrices shown above clearly indicate that there exist a gap between the importance given to the factors by customers and service providers. The weights given by the customers should be duly taken care of and the telecom service providers should work upon to minimize the gaps as indicated from the table by devising proper CRM strategies so as to get the maximum benefit of CRM implementation and side by side use this index from time to time to get the feedback of the customer to check the level of effectiveness of the devised and implemented CRM strategies (Table 7-10, Fig. 4-7).

Inferences and strategic implications: The study verified the long held belief that CRM is a multi-dimensional construct.

The critical factors that explain CRM in Indian telecom sector have been identified as competitiveness and reliability, support feature, relationship quality, transmission quality, technological edge and reputation.

Competitiveness and reliability: Customers now-a-days being more enlightened and assertive than ever before, expect consistency in the services which they receive from their telecom service provider. This coupled with trust which a customer has in his service provider and the fulfilled promises which the telecom company had made earlier, may prove to be a milestone in improving the customers perceptions about his telecom service provider.

Additionally by embarking upon benchmarking and rendering the services which are compared with those of the best in class companies in the world the telecom company can maintain its competitive posture and in turn improve its reputation in the eyes of customers. Further the competitive prices, variety of price plans, host of value added service, privacy and security and benevolence-the customer perception that the service provider always thinks about the welfare of his customers base if provided by the telecom company may infuse a positive feeling in the mind of its customers because this is what they expect from their service provider in today's fiercely competitive global scenario.

Support features: This factor includes features such as multiple channels of customers interaction responsiveness, assurance, regular feedback mechanism and signify those features which may not be affecting the customers perceptions about their telecom organization in the first instance but practicing them in the organization will attract large number of customers in future and propagate a positive word of mouth improving the goodwill of the company. This will also play a big role in maintaining the existing customer database of the companies.

Relational quality: This factor comprises of dimensions such as competent employees who are capable and competent enough to rectify the problem of the customers, courteous employees who give personalised attention to their customers. Apart from this, the customers expect that they provide the information sought, accurately and are prompt in rendering the services to them (low waiting time and quick response). Additionally dimensions such as fast fault repair and needs of customers being used to customise the services have a positive impact on the customers' perceptions about the services which they receive from their service provider.

Transmission quality: This factor is of vital importance in the light of more enlightened and demanding customers than ever before who put lot of emphasis on getting a better quality of transmission in the service which they avail from a particular telecom service provider. They in fact are even prepared to pay a premium for getting a

Table 8: Public sector telecom service provider

	Customers point of view			Service providers point of view		
CRM sub-element	Average score	Average score (S_{Ai})	Weights (W_{Ai})	Average score	Average score (S_{Ai})	Weights (W_{Ai})
CR2: Competitive prices	3.91	4.02	0.19	4.43	4.41	0.19
CR4: Variety of price plans	3.73			4.89		
CR6: Host of value added services	4.02			4.66		
CR7: Privacy and security	4.13			4.07		
CR9: Benevolence	4.31			3.99		
SF1: Multiple channels of customer interaction	3.61	3.57	0.17	3.35	3.36	0.14
SF3: Responsiveness	3.93			3.04		
SF5: Assurance	3.56			3.43		
SF6: Convenient operating hours	3.19			3.63		
RQ1: Competent employees	2.67	2.47	0.11	3.92	3.74	0.16
RQ2: Courteous employees	2.31			3.26		
RQ4: Fast fault repair/service recovery	2.85			3.81		
RQ5: Personalization	2.07			3.98		
TQ2: Network quality	3.67	3.61	0.17	3.39	3.56	0.15
TQ4: Call quality	3.21			3.74		
TQ5: Coverage	3.95			3.55		
TE1: Effective information analysis system	3.57	3.49	0.16	4.11	4.04	0.17
TE2: Seamless/hassle free integration/implementation of latest software being used	3.97			3.94		
TE3: Online availability of various schemes, services and forms	2.93			4.08		
RE1: Goodwill and image in the market place	4.37	4.32	0.20	4.58	4.33	0.18
RE2: Quality assurance system	4.26			4.09		

Table 9: Private sector telecom service provider

	Customers point of view			Service providers point of view		
CRM sub-element	Average score	Average score (S_{Ai})	Weights (W_{Ai})	Average score	Average score (S_{Ai})	Weights (W_{Ai})
CR2: Competitive prices	4.87	4.34	0.20	4.88	4.29	0.18
CR4: Variety of price plans	4.53			4.18		
CR6: Host of value added services	4.17			4.35		
CR7: Privacy and security	4.19			4.05		
CR9: Benevolence	3.96			4.01		
SF1: Multiple channels of customer interaction	3.69	3.14	0.15	3.85	3.88	0.16
SF3: Responsiveness	3.24			3.78		
SF5: Assurance	2.79			4.06		
SF6: Convenient operating hours	2.83			3.84		
RQ1: Competent employees	4.71	3.52	0.16	3.65	3.66	0.15
RQ2: Courteous employees	3.49			3.79		
RQ4: Fast fault repair/service recovery	2.81			3.82		
RQ5: Personalization	3.05			3.37		
TQ2: Network quality	3.83	3.94	0.18	4.69	4.76	0.19
TQ4: Call quality	4.29			4.84		
TQ5: Coverage	3.69			4.74		
TE1: Effective information analysis system	2.63	3.27	0.15	4.32	4.49	0.18
TE2: Seamless/hassle free integration implementation of latest software being used	3.87			4.67		
TE3: Online availability of various schemes, services and forms	3.31			4.49		
RE1: Goodwill and image in the market place	3.77	3.43	0.16	3.07	3.33	0.14
RE2: Quality assurance system	3.09			3.59		

Table 10: Comparison matrix

	Public sector telecom service provider (weight)		Private sector telecom service provider (weight)	
Factors of CRM	Customers perspective (W_{ai})	Service provider perspective (W_{ai})	Customers perspective (W_{ai})	Service provider perspective (W_{ai})
Competitiveness and reliability	0.19	0.19	0.20	0.18
Support features	0.17	0.14	0.15	0.16
Relational quality	0.11	0.16	0.16	0.15
Transmission quality	0.17	0.15	0.18	0.19
Technological edge	0.16	0.17	0.15	0.18
Reputation	0.20	0.18	0.16	0.14

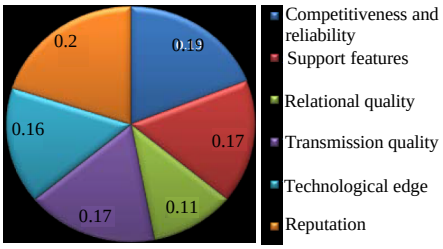

Fig. 4: Weightage given by customers of public sector telecom service provider

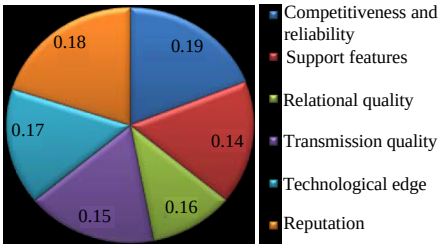

Fig. 5: Weightage given by public sector telecom service provider

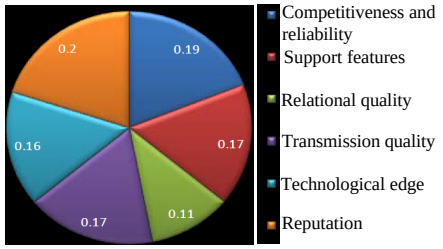

Fig. 6: Weightage given by customer private sector telecom service provider

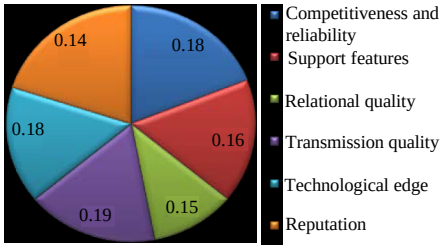

Fig. 7: Weightage given by private sector telecom service provider from their telecom service provider

better quality service from their telecom service provider but will not compromise on inferior or poor transmission quality. This factor includes dimensions such as network quality call quality, coverage and all of them play a pivotal role in improving the transmission quality.

Technological edge: Telecom service sector requires sound and effective technological requirements in meeting and/or exceeding the expectations of its customers.

Dimensions such as effective information and analysis system, seamless/hassle free integration/ implementation of latest software in the technology being used by the company and online availability of various schemes, services, forms etc. are some of the parameters which today's customer expect from their telecom service provider.

Apart from this, use of various analytical tools like cause and effect analysis for prompt/timely exploration of probable causes of problems and barriers to success and the customers feeling about latest technology in services being used, also play a lead role in enhancing the customers' expectations of their telecom service provider.

Reputation: Telecom company's customers rely heavily upon the reputation of their telecom organization while choosing it as their telecom service provider. Some of the features upon which the customers usually rely when reputation is the deciding factor are goodwill and image of the service provider in the market place coupled with the installation of any of the quality assurance system, e.g., ISO 9000/14000/TL-9000/Six Sigma may tilt the balance in favour of a particular telecom company in the eyes of its customers.

CONCLUSION

Around the globe various standard methods are employed to rank the companies within an industry and identify the industry leaders from getting responses from

all the companies and distributing weights to the criteria on which responses are received. For example interbrand uses discounted values and Fortune Magazine uses company revenue to rank the companies. The approaches used by these companies to rank the companies is very robust and already in practice. But there is no such measure available in the Indian telecom industry that captures the behaviour of the customers and assigns more importance to those factors on which customers give more emphasize. The outcome of the research in terms of CRM index is an innovative tool which forms the cornerstones for the CRM strategies for the Indian telecom sector by laying down the importance of the various factors and indicators as being perceived by the existing customers of the Indian telecom houses. Although, previous research studies (Sin *et al*., 2005; Scott *et al*., 2008; Wang and Feng, 2008; Chen *et al*., 2009; Agariya and Singh 2011a, b, 2012a, b) done in the context of different service sectors have proposed empirically validated models and scales, however there is a paucity of research done in context of Indian telecom services with a focus on developing a conceptually validated CRM index. Here lies the contribution of this research by proposing a holistic view of CRM in form of a valid index specifically catering to Indian telecom sector. These factors should be duly considered by the Indian telecom service providers in order to achieve a high degree of customer satisfaction and business performance which are the primary and compulsive goals for any business organization in the current competitive scenario. Academically, this research bridges the gap in the existing literature by proposing comprehensive index specifically catering to Indian telecom service providers. Managerially by implementing the proposed index by Indian telecom houses can enhance their customer acquisition, customer retention and overall profitability. This will ultimately have a positive impact on Indian economy as this sector is growing at a faster pace.

Novelty of this research lies in the fact that considering the views of customers of different telecom service providers all across India and proposing a comprehensive model for better implementation of CRM in telecom sector. The different perspectives identified from this research will serve as a guideline in formulating the segmentation strategies for Indian telecom service providers.

LIMITATIONS

The sample sizes itself were relatively small which is one of the limitations of this study. Large and more diversified samples can be taken for the further enhancement as well as validation of this research. The applicability, validation and generalizability of the proposed index can be done by replicating this study in CRM aspects of other business segments at a national level.

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