

## Online Sales Tracking and Tax Collection (OST2C) Mechanism for Indian Context

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### Abstract

Present day society is smart society where most people are equipped with smart electronic gadgets. In this digital revolution, E-commerce and M-commerce is becoming more and more popular and providing substitute to physical shopping. However, even with rapid increase in online sales, the buyer and the seller remains behind the curtain, and tax on these sales cannot be collected, in desired manner. As a result, the revenue decreases and government budget gets affected negatively. In India, presently there is no strict policy for collecting tax corresponding to these online sales transactions. Therefore, need for an effective system for e-taxation regime is becoming apparent for government and the society. This work focuses on this problem of monitoring every online sale, calculating sales tax and collecting it in government account. For this purpose, this paper outlines Online Sales Tracking and Tax Collection (OST2C) mechanism, which is an agent based mechanism. This framework provides one stop promising solution for stated problems and can work all the time without being tired. It can be a useful source for policy makers in collecting online sales tax.

**Keywords:** Value Added Tax, Online-shopping, online transaction, intelligent agent, online sales, E-commerce, M-commerce.

### Introduction

The tax revenues are a major source of income to the Government - whether it is in the Central or State. There have been numerous statutory provisions giving powers to the government to levy both direct and indirect taxes (VAT). Over a period of time, numerous tax procedures have been evolved and various tax authorities have been formed to streamline the tax collections. Even then each year thousand crore of rupees of tax due on internet sales are left uncollected under the current Indian system [01,02]. The amount of this uncollected tax on internet sales is expected to rise each year as e-commerce continues its rapid growth. E-commerce sales reached 2,385 lacs of rupees in 2006, and a recent study conducted by eMarketer revealed that e-commerce sales could rise to more than 50,000 crore rupees up to 2015 per annum in India. These sales on which no tax has been realized leave a lot of potential to government revenue on the table. It is estimated that these losses totaled up to 7,677 lacs rupees in 2008, and could rise to 44,000 lacs by 2015 [03]. The frustrating aspect of these losses is that they are not the result of the elimination of any tax but rather are the result of an inadequate technology of collecting the tax. Collecting tax on all internet sales would be beneficial to the Indian economy for several reasons. First, since sales taxes are collected by the states, the collection of the taxes could address state budget shortcomings. Second, the sales taxes increase the transparency between the different taxes slabs imposed on different product/items/services etc. This work aims to develop an agent based mechanism for tracking/capturing the online sales and calculation of sales tax, which will be transparent to the business entity as well as to the sales tax authorities.

This work has its base on extensive literature survey to identify research work conducted on online shopping, existing VAT rules and tax collection rules in India. Because the review of existing literature

helps to identify gaps in literature and provides opportunities for further research in future. Next section presents review of existing literature in concerned domain.

## Review of Literature

Although a lot of efforts have been made to improve the working of sales tax offices yet a lot of gaps are still prevailing in this field. This work aims to highlight the work done in this field and tries to explore the feasibility of using agents for capturing online sales taxes. For instance, Kau et. al [04] studied the online buying behavior among a group of Internet users. On the Basis of a sample of over 3,700 Internet users, the information seeking patterns as well as their motivations and concerns for online shopping were studied. Alm et. al [03] explained that the rapid growth in online commerce has harmed state sales taxes. The data was collected from eBay.com for a “representative” commodity classification on a “typical day” Baudier et. al [02] discussed the case of the goods believed to be tax-free by many internet consumers but were actually taxable. It was observed that many online retailers, such as Wal-mart collected sales taxes from their customers, after being pressurized by the states. Bingi et. al. [05] has emphasized that due to existence of Web, geographical boundaries have disappeared for an enterprise. Thus, an E-commerce initiative can easily become a global E-commerce initiative; its extraordinary growth over the past years is a clear indication of its enormous potential for influencing the way business would be conducted in the future.

Bruce and Fox [06] extended the quantitative estimates of sales tax revenue losses from e-commerce in a variety of ways. Revenue losses estimated were prepared for every state with reference to sales tax. Their baseline estimates suggested that the e-commerce would cause about \$10.8 billion in additional tax revenue losses nationwide in 2003. Goolsbee [07] had explained that a final thought regarding the domestic taxation of the Internet, the losses of tax revenue due to e-commerce were likely to be small in the short run and rise enormously with the passage of time. The work presented in [08] used detailed data from eBay to highlight effect of sales tax on online browsing and purchasing behavior of customers. The work presented in [09] took a pragmatic look at the appropriate sales tax policies for the information highway composed of Internet/on-line service providers, content, hardware/software, and telecommunications transmission. Their general conclusion was that the sales tax should be designed to be largely consistent with the current structure. Wen et al. studied the emerging models of e-commerce web site design in [10]. The models were categorized based on different website design strategies. Singh et al. [11] focused on delivery of reliable, secure, fault tolerant, sustainable, and scalable infrastructures for hosting internet-based application services. Cloud service provides large scaled computing infrastructure at a cheap price. Problems could be tackled with the help of mobile agents. Mobile agent could be transported its state from one environment to another, with its data intact, and is capable of performing appropriately in the new environment. Singh et al. [12] has proposed critically based agent replication strategy. It adapts well in the transient environment of the agents and provides fault tolerance and optimum utilization of the system resources. Xu et. al [13] proposed a framework for agent-based trust management (ATM) that provided trustworthy computing in online auctions. The mechanism of using Intelligent Agents (IAs) to facilitate electronic trading was studied in [14]. An IA is a software program designed for performing a specific task based on its own knowledge on behalf of its user. Calisti et al. [15] explained that use of software agents in the financial industries would certainly change the future development of financial services and on-line business. Guttman and his team [16] developed software agents for automation of variety of tasks involved in buying and selling products over the Internet. Zeng [17] presented a multi-agent system for providing shopping services for the commodities that a consumer does not buy frequently. A Working Paper [18] on VAT demands for additional possible policy measures to the mini ‘One stop shop’ which could be introduced in the field of VAT to enhance the taxation of the digital economy.

After going through the above review of literature it has been observed that no research work has been carried out in the concerned field. Therefore, as per old tax collection system the dealer (having physical entity) is responsible for the due tax to be deposited by him as per the sales conducted by him during a stipulated period of time (after 3 months). But as we discussed for online sales, there is no physical entity and no one knows from where the sales are being conducted and to whom are these being sold. Thus tax

collection authorities are unable to discover the physical entity of the online sales store. Hence the sales tax could neither be controlled nor be deposited in the government account. This huge loss will be increasing exponentially day by day. Thus after having the research orientation over the above studies and issues that have emerged, it is evident that demand for a system which is proactive and offers one stop solution is highly raised by the community. In fact, software agents seems to offer a promising solution as these intelligent entities are autonomous and can work 24X7 without being tired. Therefore, this gave us motivation for proposing an agent based automated mechanism for tracking online sales and calculating and collection of tax. Next section elaborates the proposed framework.

## Proposed Framework

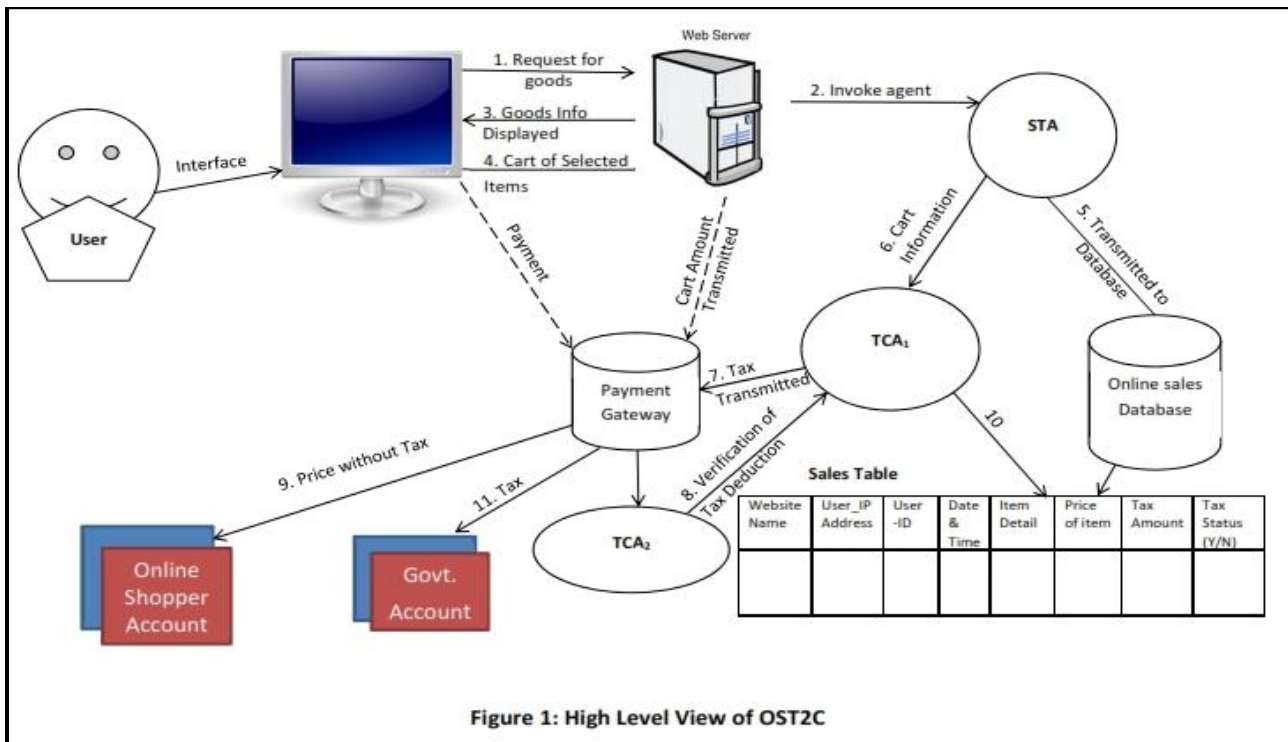
This work presents an online sales tracking and tax collection mechanism (OST2C) which is an agent based mechanism. In OST2C intelligent agents have been deployed for automation of sales tracking, tax calculation and its collection. The proposed framework comprises of Sales Tracking Agent (STA), Tax Calculation Agent (TCA<sub>1</sub>) and Tax Collection Agent (TCA<sub>2</sub>). The high level view of framework is depicted in Figure 1.

Description of the agents deployed is as follows:

A. *Sales Tracker Agent*: This agent serves as the background interface between the consumer and the shopping website server for tracking the sales of items/goods to the consumers. STA is capable of replicating [12] itself so that one dedicated agent is associated with every incoming user. This replica of STA will maintain record of concerned online buyer's user\_id, ip\_address, date\_time, item\_details, etc. in Online Sales Database. The purpose of this database is to have record the every online sale for tax purpose. STA also interacts with the Tax Calculation Agent (TCA<sub>1</sub>). It sends the required information to TCA<sub>1</sub> and waits their response before proceeding to next step.

B. *Tax Calculation Agent (TCA<sub>1</sub>)*: It interacts with STA and receives the amount of the items/goods for the VAT (value Added Tax) calculation. After completing the process of calculating the tax, it interacts with the payment gateway and TCA<sub>2</sub>. It also interacts at the same time with the online sales database for updating the related record. TCA<sub>1</sub> also communicate with the TCA<sub>2</sub> for verification of the VAT status and update the same in the online sales database.

C. *Tax Collection Agent (TCA<sub>2</sub>)*: This agent is responsible for generating the actual status regarding the deduction of VAT to the government account. It interacts with the payment gateway and TCA<sub>1</sub> for verification of VAT amount due and deposits it in the government account for all items/goods to be sold online.



Next subsection provides the detailed working of OST2C

### Working of Online Sales Tracking, Tax Calculation and Collection Mechanism(OST2C)

The various agents described above, work in close coordination with each other. Initially, the user interacts with the online shopping website for the purchase of items/ goods. Once STA gets invoked automatically, it remains dedicated to the current user for this complete transaction. The moment the user selects/clicks the items for purchase, STA invokes TCA<sub>1</sub>. The information about cart/items will be transmitted to the STA which will further pass it to TCA<sub>1</sub> for VAT calculation. Further STA insert the transaction information received from the user, is recorded in database with user\_id and ip\_address of the buyers for future reference. Items/cart information is then passed by STA to the Tax Calculation Agent (TCA<sub>1</sub>) for the VAT calculation. Once TCA<sub>1</sub> calculates the amount of the VAT, it activates TCA<sub>2</sub> and it passes amount of goods along with amount of VAT. Simultaneously TCA<sub>1</sub> also passes the same information to Payment gateway once the user clicks on make payment button. Roll of TCA<sub>2</sub> is to keep an eye on the financial transaction made by the user and to ensure whether VAT amount is properly transferred to government bank account or not. Thus tax deducted and price of the items sold will also be updated in the database for future reference.

This way VAT will be deposited in the government account directly from the payment gateway. Even if the customer leaves the transaction without making payment, TCA<sub>2</sub> will monitor this transaction and whenever user will again select same cart, TCA<sub>2</sub> will get activated. Next subsection provides the work flow of OST2C.

### Flow Diagram of OST2C

The flow diagram of OST2C is shown in figure 2.

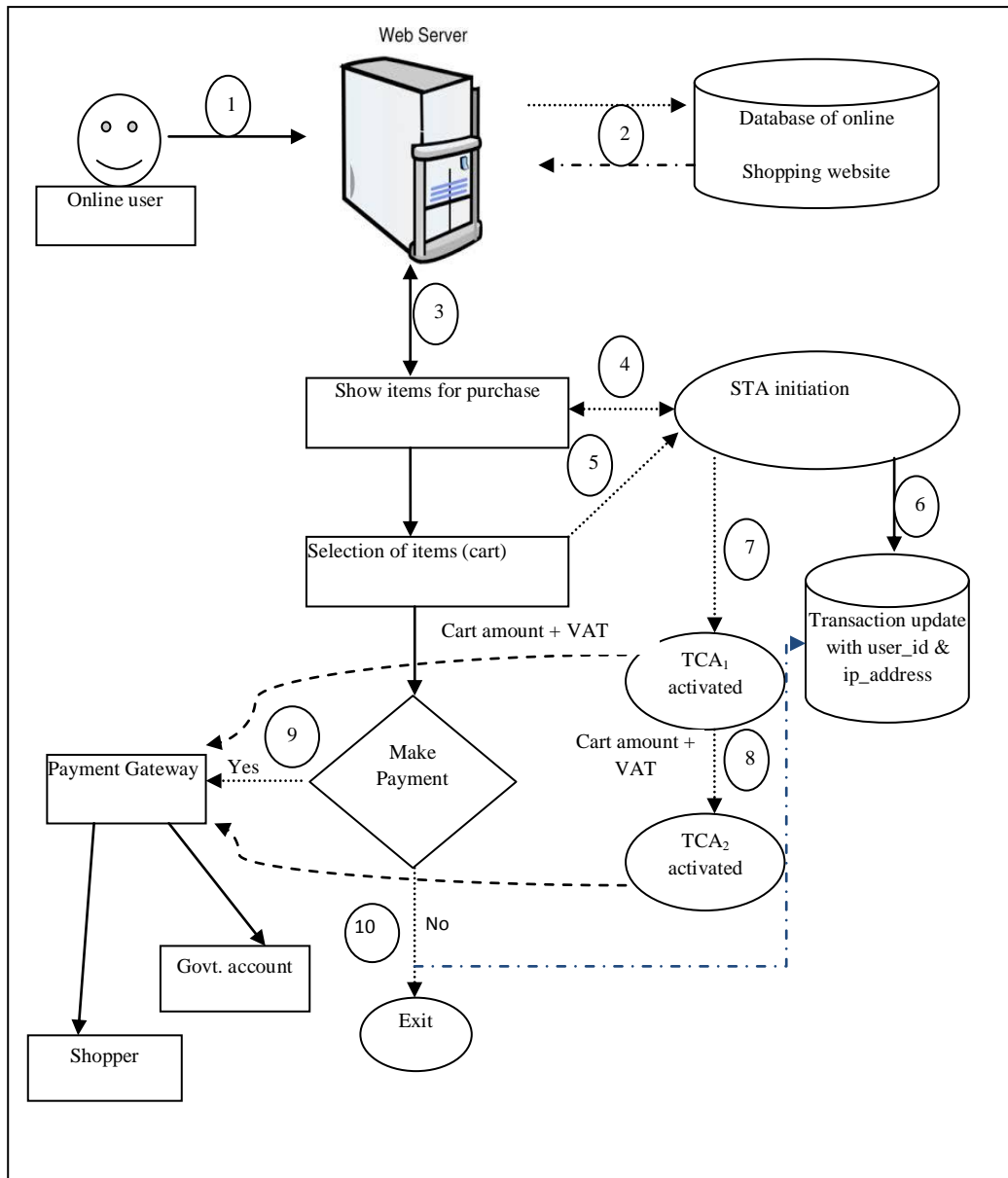


Figure 2 Data Flow Diagram of OST2C

The figure 2 illustrates the sequence of steps being followed during the automatic sales tracking, Tax calculation and collection by intelligent agents in online shopping process is given below.

1. Customer accesses the online shopping website for the purchase of items/goods.
2. Request is transferred to the web-server.
3. It provides goods/items information to the user from the database of online shopping website.
4. The moment the user browses some goods for purchasing, one instance of Sales Tracking Agent (STA) gets invoked automatically and it keeps an eye on user's activities dedicatedly.
5. When cart of the selected items is chosen and customer wishes to make payment, the STA collects the required data at the backend.
6. STA makes an entry in the database for respective user\_id and ip\_adress.

7. STA invokes  $TCA_1$ , and passes cart information to it. However this working of agent remains abstracted from user.
8.  $TCA_1$  calculate the VAT amount and makes an entry in the database.
9. When user wishes to make payment,  $TCA_1$  activates  $TCA_2$  and passes both cart and VAT amount to it. Further  $TCA_1$  also passes required information to payment gateway for collection of the amount of items from the user.
10. In case, if user refuses to make payment and leaves the transaction incomplete, even then  $TCA_2$  is invoked. In this case  $TCA_2$  makes an entry in the database with transaction status incomplete and payment status pending.  $TCA_2$  remains dedicated with this transaction and gets activated again if user wishes to resume this transaction sometime later in future.

Next subsection presents algorithms of various agents deployed in OST2C.

## Algorithms

The algorithm for Sale Tracking Agent (STA), Tax Calculation Agent( $TCA_1$ ) and the Tax Collection Agent( $TCA_2$ ) are given below:

Sale_Tracking_Agent ()	Tax_Calculation_Agent()	Tax_Collection_Agent()
<pre> Input : select data from db(item); Output:- cart_info Accept( category_of items); {   Display:item_id,item_value,   additional_details.   While not ( End_of_selection)   {     If (item_selected)       Cart ← add (item)       Cost ← cost+item_cost;   }   Insert info in sales_record_table;   Invoke (tax_calculation_agent);   Pass <math>TCA_1</math> ← cart_info;   Sleep(); }</pre>	<pre> Input cart_details_accepted_from_STA Output:- VAT {   While(!End)   If (item_found)     cost= cost+ item_cost;     VAT= cost* %_of_tax/100     Total_cost= cost+ VAT     Insert VAT info in sales_record     table;     Invoke (<math>TCA_2</math>);     <math>TCA_2</math> ,← VAT info;     Sleep() }</pre>	<pre> Input Tax_details_accepted_from_<math>TCA_1</math>; Output:- tax_collected_status. {   If (VAT_status==paid)   {     Dbms:tax_status← 'Y';     Dbms:tax_amount:=VAT;     Transaction_status:=complete;   }   Else { Dbms:tax_status← 'N'     Transaction_status:=not_complete;   }   Sleep(); }</pre>

This agent based Framework for capturing online transactions is useful especially for governmental officials to capture all the transactions which are to be completed in their jurisdiction of collecting the sales tax. This Work will broaden the One Stop Shop faith including all B2C (business to consumer) supplies of goods and services.

Although the system is complex, yet seemingly it is quite simple for the user because complexity of the system remains abstracted from the system. However, practical implementation of the same may encounter many challenges.

## Result and Discussion

The online sales tracking, tax calculation and collection (OST2C) framework is of practical importance for Indian government for collecting due sales taxes from online shopping websites in cyberspace. To check the applicability of this framework in practical scenario it was necessary to implement it. This mechanism has been implemented as a prototype system using C# and ASP.NET framework. The figure 3 shows the initiation of online shopping process. In this, user first selects an online shopping website.

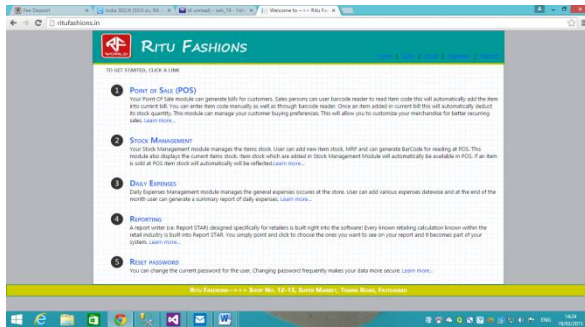


Figure 3. Online Shopping Process Initiation

Date	Item Name	Qty.	Total Sale	Discount	Net Sale	Expense Amount	VAT Amount	Net Amount
01-Jul-2015	Ladies Kurties	2	795	95	700	60	98.000000	542
01-Jul-2015	Ladies Laggings	1	395	0	395	60	55.300000	280
02-Jul-2015	Ladies Laggings	1	395	0	395	0	55.300000	340
03-Jul-2015	Ladies Kurties	2	2090	190	1900	500	266.000000	1134
03-Jul-2015	Ladies Premium Suit	1	2495	495	2000	500	280.000000	1220
06-Jul-2015	Ladies Premium Suit	1	6295	595	5700	500	798.000000	4402
07-Jul-2015	Ladies Premium Suit	6	17370	1975	15395	500	2155.300000	12740
07-Jul-2015	Ladies Long Dress	1	1499	149	1350	500	189.000000	661
07-Jul-2015	Ladies Lower	1	395	35	360	500	50.400000	-190
07-Jul-2015	Ladies Nightwear	1	769	119	650	500	91.000000	59
07-Jul-2015	Ladies Kurties	6	7074	919	6155	500	861.700000	4793
07-Jul-2015	Ladies Laggings	3	885	0	885	500	123.900000	261
07-Jul-2015	Ladies TOP	4	2935	290	2645	500	370.300000	1775
09-Jul-2015	Ladies TOP	2	1294	95	1199	500	167.800000	531

Figure 4. Transaction Recorded in Online Database

Figure 4 shows that the STA has been used to transmit the required information to the database for future use. The TCA<sub>1</sub> and TCA<sub>2</sub> works as explained in the previous section and the required data and the control has been sent to the payment gateway when user wishes to make payment as is shown in Figure 5.

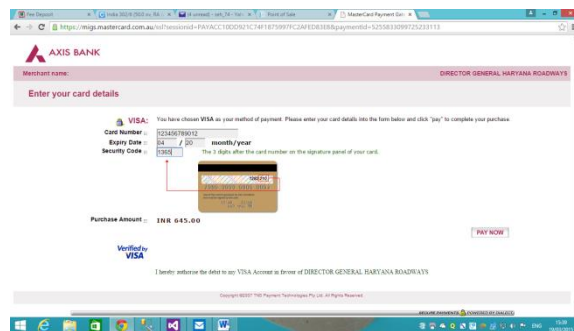


Figure 5. Payment Gateways Interface

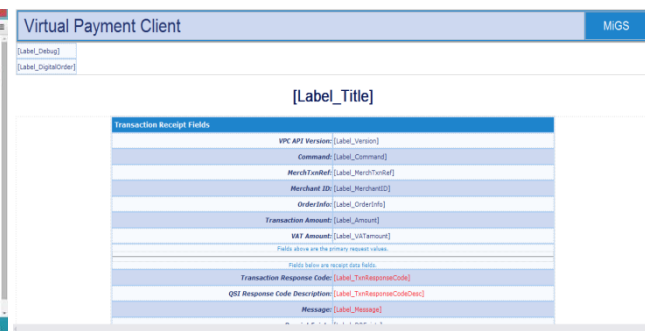


Figure 6. Virtual Payment Clients Coding

On transmitting the information of item price (without VAT), VAT amount and related information, the TCA<sub>1</sub> also sends the same information to the TCA<sub>2</sub> for the verification of the VAT amount whether it is deposited in the government account or not. The Figure 6 given below illustrates the transaction receipt which includes details of the user and the online shopping website. It also lists the information regarding the deducted amount and amount deposited.

This framework has been implemented as prototype. However, its actual implementation will depend on the government policy and cyberspace regulation which requires amendments in existing sales tax collection policies of government. Further policy designed and adopted by government will have to be strictly enforced on online shopping websites existing in Indian cyberspace.

Once the rules are framed only then we would be able to implement this mechanism completely. However, it will uniquely contribute towards resolving the sales tax collection problems faced by the government from these online sales in cyberspace and will act as a starting step in this direction.

## Conclusion

The OST2C may prove to be a very useful source of information to Policy makers regarding the Sales Tax and service tax Collection from Online sales and to regulate the tax collection policy and programs accordingly from these online shopping websites. The objective of this work is to identify and solve problems prevailing in collecting sales tax on online sales and other online services existing in the Cyberspace. The paper has provided an integrated framework for study, design and implementation of OST2C. The findings also identify a number of issues such as denial of transaction by client or payment being collected on delivery of the product, that need to be addressed for online shopping and collection of sales tax accordingly.

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