

Reversing the trend: low cost and low risk methods for assuring proper duty payments

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Abstract

This paper examines the extent to which commodity classification errors may contribute to customs revenue shortfalls. It identifies the root causes of this chronic problem and the traditional approaches that have been applied to address traditional community classification monitoring and enforcement, with little evidence of success. It then discusses other approaches that are worthy of examination, such as artificial intelligence technologies, to monitor Harmonized System (HS) declarations that affect duty underpayments, commodity data quality, systems integrity, and risk assessment.

Introduction

It is estimated that 120,000 vehicles currently driving the streets of Los Angeles, California are stolen. With so many stolen cars on the road, one might expect that a significant number would be identified by the police ... even by chance ... yet very few are.

To address its stolen car problem, the Los Angeles Police Department installed automated licence plate readers on its squad cars. Prior to the installation of the readers, police officers were capable of verifying about 15 cars per hour. Now, a single machine reads and verifies as many as 240 licence plates per minute. During its first day on the job, one licence plate reader identified 17 stolen cars while driving through the parking lot of a suburban Los Angeles shopping mall. The traditional “hit-or-miss” approach rarely yielded more than a handful of positive IDs during an entire year.

For decades, commodity reporting errors have presented a similar problem for customs authorities. Millions of customs declarations are filed each year containing commodity classification errors, but only a small number of them are ever detected.

This paper examines the extent to which commodity classification errors may contribute to customs revenue shortfalls. It discusses the root causes of this chronic problem, and explores how innovative monitoring and enforcement technologies could be used by Customs to automatically identify commodity reporting and duty payment errors.

Background

Despite the overall trend towards lower tariffs and freer trade, customs duties remain a significant source of income for many countries. During the period 2001-06, the share of trade tax revenue in terms of total tax receipts amounted on average to 2.5% in high-income countries, 18.1% in middle-income countries and 22% in low-income countries. In nine countries, tariff receipts accounted for more than half of all tax revenue in at least one year during this period (Baunsgaard & Keen 2009).

The problem of tariff revenue dependency has been exacerbated by the global economic recession of 2008, which has resulted in plummeting trade volumes and falling revenues (Seth 2009). It has therefore become even more crucial for middle- and low-income countries to ensure that duties are properly assessed and collected.

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For many countries, collecting duties has been a challenge. In Africa, the tariff collection rate (that is, the ratio of actual tariff revenue to hypothetical tariff revenue had the statutory tariff rate been applied) is frequently under 70%, and in some cases does not reach 50% (Baunsgaard & Keen 2009).

Misclassification of commodities is widely recognised as the single greatest cause of non-compliance, but it is often ignored as a source of significant revenue. This is largely due to the perception among customs authorities that (1) classification errors do not account for very much revenue, and (2) detecting classification errors requires too much effort and expense (Bolton & Hand 2002).

A recent report by the Auditor General of Canada revealed that one out of every three entry lines is misclassified (Auditor General of Canada 2010). Apart from the less obvious negative fiscal impact on such areas as trade statistics/trade policy, risk assessment/targeting, and customs controls/admissibility, it is estimated that USD22 billion per year is owed to government treasuries worldwide because of misclassification alone.¹

Table 1 shows an estimation of the amount of duty underpayments due to misclassification for countries whose duty revenue accounts for more than 20% of overall government revenues.

Table 1: Estimated duty underpayments due to misclassification

Country	Value of Imports (in USD billions)	Average Rate of Duty (Trade weighted)	Ratio of Duties to Total Gov't Revenues (%)	Duty Collections (in USD millions)	Duty Underpayments (in USD millions)
Maldives	1.4	20.60%	72.501	288.4	7.30
Swaziland	1.3	8.90%	65.963	115.7	2.93
Kuwait	21.3	5.00%	63.561	1,065.0	26.94
Gambia	0.3	14.50%	53.3	43.5	1.10
Madagascar	3.8	9.30%	49.231	353.4	8.94
Bahamas	3.0	22.80%	47.19	684.0	17.31
Saint Vincent and the Grenadines	0.3	12.00%	44.903	36.0	0.91
United Arab Emirates	104.7	4.20%	43.52	4,397.4	111.25
Namibia	4.0	9.30%	42.573	372.0	9.41
Vanuatu	0.2	19.70%	37.91	39.4	1.00
Belize	0.5	15.90%	37.23	79.5	2.01
Bangladesh	17.3	9.20%	35.636	1,591.6	40.27
Senegal	6.5	8.90%	34.7	578.5	14.64
Sudan	9.8	14.00%	34.55	1,372.0	34.71
Oman	22.9	4.90%	31.8	1,122.1	28.39
Cote d'Ivoire	8.0	6.60%	30.541	528.0	13.36
Bahrain	6.1	6.40%	30.324	390.4	9.88
Uganda	4.5	11.10%	29.404	499.5	12.64
Botswana	5.1	7.50%	24.187	382.5	9.68
Ghana	9.1	8.60%	24.084	782.6	19.80
Philippines	50.0	5.90%	22.454	2,950.0	74.64
Guinea	1.9	11.90%	21.703	226.1	5.72
Guinea-Bissau	0.1	13.50%	20.48	13.5	0.34

Source: Extrapolated from WTO Country Profiles, IMF Survey to determine the percentage of national revenue represented by customs duties, 2011, and Auditor General of Canada reports concerning compliance measurement 1994, 1997, 2001, 2003, 2007, and 2010.

Root causes of misclassification

Formally known as the ‘Harmonized Commodity Description and Coding System’, the Harmonized System (HS) is the global standard used by Customs to classify all imported products. HS codes are used by nearly 200 countries for a variety of purposes including duty and tax assessment, determination/enforcement of admissibility rules, risk assessment/targeting, and tracking trade flows.²

Although much has been written about the generally poor state of customs commodity reporting (Bagai & Wilson 2006), very little consideration has been given to its cause(s).

Primary contributors to misclassification are:

HS complexity

The HS is a structured multipurpose nomenclature, organised into 21 Sections and 96 Chapters. Goods are generally classified by what they are (and sometimes what they are made from, and/or what they are used for), and according to a strict (and often complex) set of rules and legal notes. Frequently, commodity classification is not straightforward and additional research or input from HS experts is needed.

To acknowledge the complexity of the HS and to assist its users, the World Customs Organization (WCO) has developed a substantial number of publications and databases over the years. While these are wonderful products (the four volume HS Explanatory Notes, in particular, are indispensable tools for HS classification), the instruments were designed for customs officers and other experts. They were not designed with the international trader in mind. And they were not designed with electronic data processing in mind.

These factors contribute to the difficulties associated with properly classifying products in the HS (Singh & Sahu 2004).

Gaps in terminology

Although the HS has been designed to cover goods of every kind, it does not describe every kind of good explicitly. More importantly, products are seldom described in everyday language. HS commodity descriptions are often extremely technical, legalistic and sometimes impenetrable by anyone other than a domain expert. This gap that exists between how products are expressed by trade and how they are described in the HS is exemplified as follows:

The commercial description:

“woven ladies raincoat, rubberized cotton”

is properly associated to the HS headings/subheadings that provide for:

ARTICLES OF APPAREL AND CLOTHING ACCESSORIES,
NOT KNITTED OR CROCHETED

62.10	Garments, made-up of fabrics of heading 56.02, 56.03, 59.03, 59.06 or 59.07
6210.30	- Other garments, of the type described in subheadings 6202.11 to 6202.19

Reliance on third parties

Since the cost of developing in-house HS classification expertise is beyond the reach of most companies (especially small and medium size enterprises), this function is commonly handed over to third parties such as clearing agents or customs brokers.

While it may be cost effective to subcontract the commodity reporting function to a customs broker or clearing agent, these entities do not bear the legal or financial liabilities associated with customs compliance.

This factor, combined with thinning margins, have compelled many third party service providers to treat HS classification as a clerical or data entry function rather than as one of knowledge management. When faced with deficiencies in commercial product data, clearing agents often do not consult with their clients and, instead, choose the more expedient route of assigning a code based on what was done previously for the same or a similar company.³ In developing countries, the problem is compounded by the fact that many clearing agents are not well trained in HS classification, and most do not have classification reference materials or tools at their disposal (Nkoma 2007).

Improper tools

In addition to the lack of availability of proper tools, another important factor in the chronic misclassification of goods is the pervasive use of keyword-based search tools. These tools, which are used heavily by importers and brokers alike, are typically integrated into HS reference and global trade management/customs compliance systems. They function by searching indiscriminately for exact or partial term matches without regard for context or hierarchical structure, and normally present a long list of potential, mostly irrelevant and often erroneous HS classification candidates. Some keyword tools are enhanced with Boolean operators (that is, ‘AND’, ‘OR’, and ‘NOT’) and expand search terms with synonyms, but none are capable of truly reading and understanding complex goods descriptions. Keyword tools do not apply HS classification rules or take into account Section/Chapter notes; they do not process weights or measures; and they cannot match to residual headings/subheadings (that is, ‘Other’).

For example, a search of the item ‘Paper shredder’ in several of the most popular web-based HS reference tools produced the following results (Table 2):

Table 2: Search term example, ‘Paper shredder’

Organisation	HS search tool	Number of potential matches	Includes correct code?
UNCTAD	ASYCUDA Online Harmonised Commodities Code database	0	No
USITC	HTS Online Reference Tool (“contains all”)	0	No
USITC	HTS Online Reference Tool (“contains any”)	822	No
HMRC	UK Trade Tariff	149	No
European Commission	TARIC	0	No
UPS	Tradeability Harmonizer	15*	Yes
FedEx	Global Trade Manager (“search for all of these words”)	0	No
FedEx	Global Trade Manager (“search for any of these words”)	156	No
DHL	Trade Automation Service Interactive Classifier	35	No
Export.gov	Customs Info	1,000**	No
Singapore Government	TradeXchange	0	No

* UPS tool returns a maximum of 15 potential matches

** Customs Info tool returns a maximum of 1,000 potential matches

On the whole, keyword-based HS tools present unacceptably low levels of precision (the measure of relevance of returned results) and recall (the measure of accuracy of returned results).

Lack of oversight

Customs itself can share the blame for perpetually high rates of commodity classification error. At one time, customs officers examined and assessed every entry. However, as the volume of cross-border trade increased, customs authorities could no longer maintain their level of vigilance without disrupting the movement of goods. Today, most customs authorities do not monitor the accuracy of commodity declarations in a comprehensive manner. Instead, voluntary compliance regimes are employed, whereby responsibility and risks have been transferred from Customs to traders (Desiderio & Bergami 2011).

The result of this paradigm shift has been more uncertainty in the quality and accuracy of reported commodity data, as well as a diminution in the likelihood that an importer/broker error will be detected (Auditor General of Canada 2010).

Attempts at solving the problem

Traditionally, commodity classification monitoring and enforcement have been addressed by a number of approaches (sometimes in combination) including:

Risk management/risk assessment

In broad terms, risk management is defined as ‘a technique for the systematic identification and implementation of all the measures necessary to limit the likelihood of risks occurring’ (DG Taxation and Customs Union, EU Commission 2007). Risk analysis and risk assessment is ‘the systematic determination of risk management priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other criteria’ (WCO 1999).

Risk assessment is widely accepted as the only practical approach to monitoring customs entries within an environment of increasing trade volumes and declining or stagnant verification resources. Risk management is widely promoted as a best practice as it allows Customs to focus its limited resources on areas of concern while at the same time facilitating trade (WCO 2007).

There is a wide variety of customs management systems that provide some risk assessment functionality. None however, are capable of assessing the accuracy of a declared HS code by virtue of its narrative goods description. In order to flag potential misclassification, risk assessment systems employ selectivity factors which may have been assigned according to a variety of criteria, including:

- tariff differentiation
- industry or product group
- historical accuracy, or
- rate of duty.

In examining the effectiveness of the Canada Border Services Agency’s risk management approach, Canada’s Auditor General discovered that, despite a CAD150 million investment in automated systems for identifying high-risk people and goods, customs officers continue to rely more on their own analysis and judgment to select shipments for examination. In explaining this discretionary approach, customs officers admitted they mistrust the accuracy of the advance commercial information that is submitted to the agency’s automated risk assessment tools (Auditor General of Canada 2007).

Thus, the old adage “garbage in – garbage out” is extremely relevant in a risk management environment. With commodity classification error rates averaging 30% (Auditor General of Canada 2010), input data cannot be considered reliable for risk assessment purposes. There is little doubt that risk assessment

systems extend Customs' limited reach in many important areas, however within these systems the cost of detecting commodity classification errors remains high and the likelihood of recovering unpaid duty revenues from misclassification remains low.

Post-entry audits

Generally acknowledged to be the most effective way of assuring proper classification and duty remittance, post-entry audits are also the most expensive since they require manual examination of documents by someone knowledgeable in HS classification.

In the 2009-10 fiscal year, the Canada Border Services Agency conducted about 2,700 compliance verifications, which resulted in the assessment of about CAD59 million in additional duties and taxes owing from importers. The Auditor General of Canada estimates that CAD6 in additional revenue can be recovered for every CAD1 invested in expert human review.

As enticing as these returns on investment may be, manual review can only be as effective as the size and knowledge of the audit staff. In most cases, Customs will simply not have enough manpower to properly examine each and every entry. Furthermore, the cost of properly training the army of auditors needed to carry out such an exercise would be prohibitively expensive.

Despite the efforts of such organisations as the WCO, the World Bank, and the International Monetary Fund (IMF) to build capacity in the area of post-entry verification, customs authorities have struggled to recruit and retain expert staff (Rosenberg 2007). In 2007, the United States Government Accountability Office revealed that U.S. Customs and Border Protection had frozen the number of 'maintenance of revenue' staff at 2003 levels, which at the time was 48% less than the quantity recommended in Customs' own Resource Allocation Model. The future of compliance monitoring and enforcement in the United States looks even more challenging as 25% of U.S. Customs trade employees become eligible for retirement within two years (United States Government Accountability Office 2007).

Pre-shipment inspection

Pre-shipment inspection (PSI) must be mentioned as a corollary to the audit approach. PSI companies provide for-fee compliance assurance services to countries lacking in monitoring capacity.⁴ Like Customs, their success in detecting commodity reporting errors depends greatly on the training and knowledge of their audit staff. Because they constitute an outsourcing of customs responsibility, PSIs cannot be considered an attractive, long term solution to the problem of customs compliance monitoring and enforcement. The benefits and pitfalls of PSI have been discussed in many forums (see Anson, Cadot & Olarreaga 2006; Low 1995; Yang 2005) and the jury remains out on their ultimate effectiveness in combating duty evasion.

Incentives/penalties

One of the lowest cost approaches to improving the quality of commodity reporting involves the threat and imposition of monetary penalties for non-compliance. Sardonicly known in many circles as 'incentives', fines have become an important tool for Customs in the voluntary compliance era, however their effect on compliance remains questionable. The government of Canada has employed the Administrative Monetary Penalties System (AMPS) since 2006. Under AMPS, approximately 1.8% of all customs entries are examined, and 0.19% are penalised. While non-compliance contraventions in Canada rose by 283% (from 6,348 to 24,328 per year), surprisingly penalty assessments fell by 21% (from 4,470 to 3,531 per year) between 2007 and 2010. This suggests that either the quality of compliance monitoring in Canada has deteriorated or Customs is forgiving many more violations. In either case, the message for importers and brokers is clear: the chances of getting caught and paying a fine in Canada are very small.

Beside the unlikelihood of a classification error being detected, the consequences do not appear to present much of an incentive either. In 2010, the average penalty assessment for failing to correct a classification error in Canada was only CAD68. This represents 0.51% of the value of the average import entry. Furthermore, 15.16% of non-compliance penalties issued by Customs were appealed and 29.67% of appeals were successful, suggesting an inconsistency in the application of Canada's compliance measurement and enforcement practices.

Manual review

No matter which approach (or combination of approaches) is employed, HS code verification ultimately requires examination of narrative data or documents by a human expert. This is why Customs normally requires importers to submit a plain language commercial product description in addition to the HS code.

The description must be the normal trade description expressed in sufficiently precise terms to enable immediate and unambiguous identification and classification (this does not mean repetition of the description found in the Tariff Handbook alongside the relevant Commodity Code) (Tanzania Revenue Authority 2006).

Regrettably, this requirement is often ignored as many customs management systems have been programmed so that goods descriptions are automatically generated from the HS itself. This practice, known as 'HS cloning', guarantees that declared HS codes and their associated goods descriptions will always agree, and makes HS classification error detection almost impossible.

Other approaches

With so much revenue at stake, and so little evidence to suggest that traditional monitoring and compliance enforcement techniques have been successful, other approaches are clearly worth examining.

Automated HS error detection

One compelling project using automated HS error detection software was conducted in 2008 by 3CE Technologies, a Canadian technology company, at the request of the Zambia Revenue Authority (ZRA). 3CE, which specialises in HS classification and natural language processing, agreed to analyse one year's worth of commodity declarations using its HS code verification engine. The goal of the project was to identify HS classification errors, duty underpayments, and commodity reporting deficiencies.

The company's software, eponymously called '3CE', which uses proprietary artificial intelligence software to read, interpret and analyse readily available commercial commodity information, was developed with substantial input from industry domain and government experts. 3CE has successfully demonstrated high levels of reliability and accuracy in HS classification and HS code verification.⁵

3CE methodology

3CE was provided with two data sets extracted from ZRA's ASYCUDA++ customs management system:⁶ a 'declaratory' set (SAD, which stands for 'Single Administrative Document') and a 'liquidation/accounting' set (IMP, which is simply shorthand for 'Imports'). It was necessary to provide two data sets because the SAD records included 'free text' product descriptions and origin information, while the IMP records included quantity and value data necessary for calculating duty underpayments.

3CE's audit process involves feeding narrative product information (that is, goods descriptions) in a batch to a query processor and inference engine. The validation process begins with an attempt by 3CE to classify the goods independently from the declarant's goods description. 3CE then compares its result with the HS code declared. Fundamentally, 3CE detects classification errors by comparing the observed data with expected values.

When products are sufficiently described, 3CE is able to confirm correct codes and flag classification discrepancies with a high degree of confidence. When critical product information is missing, 3CE provides a range of potential HS codes that were available when the classification process was stopped.

3CE confidence factors are based on the relationship between the degree to which products have been specified (that is, to which HS level – chapter, heading, subheading – classification was possible), and the number of potential commodity codes returned. Thus, when a goods description was complete enough to enable identification of one potential code at the HS 6-digit subheading level, confidence in 3CE's result was placed at 90%. However, when 3CE found multiple potential codes at the HS 2-digit Chapter level, goods descriptions were considered substandard, and a lower confidence factor was assigned.

For the purposes of calculating duty losses, only records with a confidence factor of 70% or higher were considered.

When the classification audit was completed, a duty loss calculation was performed by matching the SAD records with the IMP records.

3CE results and observations – classification

A total of 856,501 SAD records were submitted to 3CE for evaluation, representing approximately 71,000 man-hours.⁷ The total processing time for these records was approximately eight hours on a single instance of the 3CE software.

Of the 856,501 total SADs submitted, 830,521 records (96.97%) contained some narrative product information, and 25,980 records (3.03%) contained no narrative description whatsoever. Within the set of 830,521 records containing some narrative product detail, 3CE was successful in identifying the imported good on 762,986 records (91.87%). 3CE was unable to identify any discernible item on 67,535 records (8.13%) (for example, 'VELSPAN').

Despite the high level of product recognition, the majority of records still did not have sufficient product detail to enable validation of the declared HS code to the universal 6-digit subheading level. 3CE found that 731,763 of records (85.44%) were underspecified for the purpose of HS 6-digit subheading level validation.

The remaining 124,738 records (14.56%) were sufficiently detailed to enable validation of the declared HS code to the 6-digit level.

Within this set of fully-specified records, 3CE detected 37,066 HS classification discrepancies – an error rate of 29.72%. Some examples of classification errors and duty discrepancies detected by 3CE are identified in Appendix 1.

3CE results and observations – duty underpayments

Although actual duty payment information was not included in the SAD data, 3CE was able to extrapolate potential duty losses from accounting information provided in the IMP data.

In order to identify potential duty losses, 3CE examined the 37,066 records that were fully specified and incorrectly classified. 3CE compared the declared rate of customs duty associated with each incorrectly classified entry with the proper duty rate associated to the proper HS code. Since 3CE only looked at HS 6-digit subheading level discrepancies, it was necessary to associate the duty payment discrepancies to a range of duties in some cases, whereby the minimum, maximum, or average values were less than the value associated to the entry. 3CE also took into account the declared countries of origin and their associated preferential rates.

Using this method, 3CE was able to identify 3,175 records (8.56%) with a likely duty payment loss. The average applied rate of duty for incorrectly classified SAD records was 3.30%, whereas the average

rate of duty for these records should have been 10.81% according to 3CE. This created a duty payment gap of 7.51%.

Simple multiplication of the observed rate of classification error, the duty values of non-preferential entries and the duty payment gap, revealed an estimated duty underpayment of USD8.724 million for 2008.

Table 3: Estimated duty underpayments identified by 3CE

Total import duties assessed, 2008	USD 427,969,042
Observed rate of HS classification error	29.72%
Estimated value of duties from misclassification	USD 127,192,399
Observed ratio of non-preferential tariff treatment by value	91.33%
Estimated value of duties (Net of preferential treatment)	USD 116,164,818
Observed duty payment gap	7.51%
Estimated value of underpayments due to classification error, 2008	USD 8,723,978

Conclusions

There are numerous HS users, all of whom need simplified and automated access to the HS. They include:

- Customs officers – both HS experts and non-experts
- Statisticians, economists and trade analysts
- Trade negotiators
- Environmental organisations
- Other trade related government and international organisations (including NGOs)
- Customs brokers and freight forwarders
- Customs and international trade lawyers
- Shippers
- Importers and exporters
- Trade associations.

Things have changed since the HS was drafted in the '70s and '80s. As already noted, there has been an incredible increase in the volume and speed of international trade. There has also been an incredible increase in the turnover of the types of goods being traded. The uses of the HS have multiplied. The need for accuracy of HS classification information is greater than it has ever been. And finally, the state of automation today has made simplified and automated HS classification tools possible.

I believe that the Zambian project detailed above amply demonstrated the utility of automated and intelligent expert HS classification systems.

This paper has attempted to determine the extent to which commodity classification errors contribute to government revenue shortfalls. It has also explored the feasibility of using advanced technologies to comprehensively monitor HS declarations and detect duty underpayments.

Misclassification remains a chronic and costly problem for customs authorities worldwide largely because Customs has been unable to reconcile the cost of detecting classification errors with the revenues to be gained by detecting them.

A persuasive argument can be made for 100% verification when:

- the flow of trade is not impeded
- the revenues recovered exceed the cost of implementation and operation
- the processes and technologies used are reliable
- there is a demonstrable improvement in compliance and data quality.

When these criteria are met, unobtrusive and intelligent monitoring and enforcement technologies have the ability to provide broader benefits to Customs, including:

Building capacity. The use of intelligent automation technologies builds capacity by enabling effective and sustainable customs management. They fill gaps where monitoring is unsystematic and limited in scope; they enhance the effectiveness of risk assessment and targeting systems by assuring data quality; and they enable optimisation of resources.

At the same time, adoption of such technologies helps to build and protect Customs' knowledge assets, which promotes autonomy and reduces the need for outsourcing compliance management activities.

Assuring integrity. The adoption of automated compliance enforcement tools is consistent with GATT Article X, which addresses the need to administer laws, regulations, decisions and rulings related to imports and exports in a uniform, impartial and reasonable manner.

Eliminating discretion at the border provides trade stakeholders and investors with the assurance that the rule of law is applied. For the trade community, customs integrity means that the playing field is level, and that companies that invest in compliance management are not disadvantaged by those who do not.

Facilitating trade. The use of unobtrusive intelligent automation technologies facilitates trade by allowing Customs to eliminate outdated procedures (such as manual documentary checks) without diminishing its ability to monitor and control trade transactions. This reduces the likelihood of unnecessary audits, and streamlines throughput by enabling the identification of low-risk traders and goods.

Single window initiatives have become benchmarks for trade facilitation because they eliminate redundant procedures and promote standardisation. Proper and efficient use of single window systems depends critically on accurate HS classification. Compliance monitoring and enforcement technologies can play an important role in the accuracy and utility of single window systems.

Ultimately, discreet and intelligent monitoring technologies can facilitate trade by improving productivity and efficiency thereby allowing Customs to manage situations and not simply react to them.

Recommendations

Overall, the literature on HS classification errors is scant. The lack of information on the extent that these errors have impacted such areas as trade statistics, trade policy development, admissibility, and cargo risk assessment is unknown. Therefore, further study is warranted.

The examination of commodity reporting in Zambia has demonstrated that the use of intelligent, knowledge-based technologies can extend Customs' compliance management capabilities. Unfortunately, aside from that initiative, there are few examples of artificial intelligence used in a compliance management setting. Consequently, it would be instructive to conduct additional research in this area to determine the extent to which technologies of this type can support such areas as duty payments, commodity data quality, customs integrity, and risk assessment.

Appendix 1

Examples of HS classification errors and duty payment discrepancies discovered by 3CE automated audit of declarations made to the Zambia Revenue Authority.

	HS CODE	DUTY RATE (%)	TARIFF DESCRIPTION	
“STARTER MOTOR” (Sample ID SAD1-27)				
x	SAD	85012000	5	Universal ac/dc motors of an output >37.5 W
✓	3CE	85114000	15	Starter motors and dual purpose starter-generators
Duty discrepancy = 10%				
“WHEEL BARROW” (Sample ID SAD1-4390)				
x	SAD	87131000	0	Invalid carriages, not mechanically propelled
✓	3CE	87168000	15	Vehicles, not mechanically propelled, nes
Duty discrepancy = 15%				
“LINE TRAP 630 Amps, 0.2mH” (Sample ID SAD1-20439)				
x	SAD	85045000	5	Inductors, nes
✓	3CE	85423300	15	Amplifiers...Electronic integrated circuits
Duty discrepancy = 10%				
“STC STEEL CHANNELS & BEAMS” (sample ID SAD1-20851)				
x	SAD	72166900	0	ANGLES,SHAPES..OF IRON/STEEL,NOT FURTHER WORKED TH
✓	3CE	73089010	15	gates of a kind used for agricultural or railway f
		73089020	15	Structures and parts of structures, nes, of iron o
		73089030	15	Structures and parts of structures, nes, of iron o
		73089040	15	Structures and parts of structures, nes, of iron o
		73089050	15	Structures and parts of structures, nes, of iron o
		73089090	15	Structures and parts of structures, nes, of iron o
Duty discrepancy = 15%				
“HYDRATED LIME” (sample ID SAD1-23056)				
x	SAD	25223000	5	Hydraulic lime
✓	3CE	25222000	25	Slaked lime
Duty discrepancy = 20%				
“FOUNDRY COKE” (Sample ID SAD1-52858)				
x	SAD	27082000	5	Pitch coke obtained from coal tar or from other mi
✓	3CE	27040000	15	Coke and semi-coke of coal, of lignite or of peat;
Duty discrepancy = 10%				

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Endnotes

- 1 Extrapolated from World Trade Organization (WTO) Country Profiles, International Monetary Fund (IMF) Survey to determine the percentage of national revenue represented by customs duties, 2011, and Auditor General of Canada reports concerning compliance measurement 1994, 1997, 2001, 2003, 2007, and 2010.
- 2 A more complete description of the Harmonized System and its uses can be obtained from the World Customs Organization (WCO), www.wcoomd.org.
- 3 In a recent, high profile example of broker negligence, UPS Customhouse Brokerage, Inc. was found guilty of failing to ‘exercise the control and supervision necessary to reasonably conduct its customs business’. U.S. Customs and Border Protection fined UPS for repeatedly misclassifying goods under subheading 8473.30, despite repeated warnings and remedial training. UPS was eventually able to stop misuse of subheading 8473.30, but only by removing the tariff code from its computer system entirely so that its employees could not physically enter the number onto an Entry Summary. ‘This is a sad statement about the level to which UPS had to descend to attain broker compliance. Moreover, while this measure did reduce the number of entries containing goods classified under 8473.30.9000 for a short time, a computer upgrade led to the reappearance of the tariff code in UPS’ system. Once it returned to the system, UPS employees once again improperly used the tariff item despite CBP’s continued warnings not to do so’ (Pike & Parga 2009).
- 4 Across all countries using PSI between 1990 and 2000, estimated PSI fees amounted to an average of 1.3% of central government tax revenues (Yang 2005).
- 5 In 2006, 3CE scored 93% in an HS classification competition hosted by the World Customs Organization. This compared very favourably with the results of its expert human competitors who recorded average scores of 77% (for 100 government experts) and 68% (for 95 experts from the private sector). 3CE’s audit results have been vetted independently by commodity classification experts. 3CE software is used by many organisations, including U.S. Customs and Border Protection, the United States Census Bureau, and the European Commission – Eurostat.
- 6 Automated **SY**stem for **CU**stoms **D**ata.
- 7 Assuming that it would take a human expert five minutes to examine one record.

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