Supply chain risk management in the mango exportation chain

Josue Ferreira Neto
Production and Operations Management Department
Escola de Administração de Empresas da FundaçãoGetúlio Vargas (FGV-EAESP)

Susana C. Farias Pereira (susana.pereira@fgv.br)
Production and Operations Management Department
Escola de Administração de Empresas da FundaçãoGetúlio Vargas (FGV-EAESP)

Abstract
The study presents an analysis of the main risks associated with the mango exportation chain between Brazil and USA. Interviews were carried out with specialists from this chain. Main results indicate despite production technology and favorable climate conditions, product´s characteristics and management issues pose serious threats to this chain competitiveness

Keywords: supply chain risk, mitigation strategies, types of risk

Introduction
Modern society is increasingly based on the globalization of its production systems, supply of raw materials and consumer market. (Paulsson, 2004). The complexity of the chains at levels associated with global search for efficiency, volatility of demand, adoption of lean practices and increasing natural disasters and terrorist attacks show an increasing disruptions in supply chains. (Cristopher and Peck 2004; Zsidisin et al 2005).

Understanding the behavior of risk in the supply chain and, therefore, propose efficient ways to manage and mitigate the uncertainty is of fundamental importance to maintaining the competitiveness of firms and chains.

The rationale for this research comes from the emerging importance of the topic in academia and the theoretical gap found by reviewing the literature on *Supply Chain Risk Management* (SCRM).

SCRM has been of growing interest for both practitioners and academics over the past years (Tang and Musa 2011). However, research in SCRM is still underexplored and in its early stage of development (Vanany *et al.* 2009; Jüttner, Peck and Christopher, 2003). Sodhi, Son and Tang (2012) indentificaram the need for empirical research in the area. In a review of literature on the subject, Christopher *et al.* (2011) identified lack in understanding of how risk should be assessed in global sourcing decisions and how these risks should be mitigated.

The increase in demand for healthy food and the technological advancements in production allowed the expansion of Brazilian fruits in the international market. (Vitti and

Boteon 2008). Brazil is the third largest exporter of mango in the world, with 110 tons shipped in 2009. However, various risks threaten the product flow and profitability of the supply chain members. Losses are estimated between 20% and 40% throughout the post-harvest fruit (Choudhury 1995), which would cause a significant loss of food, beyond the economic impact for producers, distributors, exporters and consumers.

The lack of favorable climatic conditions for the cultivation of tropical fruit makes the U.S. an attractive market for Brazilian mango. (FAOSTAT, 2010). Brazil exported twenty-five thousand tons of mangoes to the United States in 2011. (National Mango Board, 2012).

This study aims to empirically analyze what are the main risks in the mango supply chain. To achieve the overall goal, the following intermediaries objectives were established: describe and understand the mango supply chain and identify the main risks affecting it.

Literature review

To understand risk management in global supply chain is important to understand what leads firms to participate in global chains and exposing themselves to the risks inherent in this type of chain. Bozarth, Handfield and Has (1998) describe key factors: (1) local restrictions - companies that do international business are, often pressured by local governments to keep part of their production or purchase of components in these countries, (2) Low price - this is the most common strategies in global supply, (3) Quality - companies around the world are producing quality products similar to those from developed countries' suppliers, (4) access to technology and new markets - the search for components and materials in foreign markets brings new technologies not yet known in countries where manufacturing is performed.

More broadly, Christopher *et al.* (2011), presents the main benefits of a global supply: low cost, high technology and access to emerging markets, best quality, increased speed and flexibility, ensuring availability of limited resources, introduction of competition-based suppliers to the local market, and best political and regulatory environment in the markets supply.

However, Peck *et al.* (2003) argue that trends such as the growth of globalization, outsourcing, reduced supplier base, industry consolidation, centralization of distribution, among others, are weakening supply chains. Thus, changes motivated by benefits they bring, while several risks to the supply chain.

Christopher and Lee (2004) warn that all organizations are at risk of supply chain and those involved in global relationships are exposed to more complex and uncertain environments. According to Christopher *et al.* (2011), three factors make the more global chains at risk: chain members participate in several other chains, chains stretch across distant regions on the globe and the chains are affected by changes and macroeconomic policies of different countries.

Managing risks in the supply chain has become an important activity for most organizations, tending to increase its importance due to the increasing globalization of supply chains (Khan and Burnes, 2007).

Christopher *et al.* (2011) argue that although there are many studies on risk management in supply chains, there are few studies about tools and strategies for risk in global chains. Therefore, due to the complexity and risk exposure of global chains and the lack of studies to explain its phenomena, Christopher *et al.* (2011) punctuate the need for further studies.

Methodology

This research aims to understand not only historical practices, but also current ones. Moreover, there is no intention to influence behavioral events in the surveyed companies. Therefore, the cse study method was chosen. According to Sodhi, Son and Tang (2012) there is a need for new case studies in SCRM.

Data was collected through in depth interviews with key informants from mango chain supporting organizations such as: Valexport, SEBRAE, Embrapa semi-arid and National Mango Board. The interviews sought to understand the production system, distribution and chain architecture of the mango chain, as well as current industry characteristics (strengths and weaknesses) and potential threats to its development.

The research protocol script was used to ensure the approach of the themes set forth in this phase of the research. The interviews were recorded and transcripted right at the end of each of them.

Analysis of results

This session presents and analyzes the characteristics and main threats to the global supply chain of mango between Brazil and the United States. This analysis was aimed at identifying and understanding the structure, relationships, product flow and potential threats to the global supply chain of mango.

Voss, Tsikriktsis and Frohlich (2002) emphasize the importance of triangulation, that is, the importance of using different sources of evidence for the same phenomenon, in order to increase the data reliability.

Mangoes in Brazil

Brazil produced 42 million tons of fruit in 2010, reaching a gross value of U.S. $17 billion (Ibge 2012). The country is the third largest fruit producer in the world, behind China and India (Ibraf 2012). Production meets almost all domestic demand, so that only a small amount of mainly cold-climate fruits is needed. There is a increase in the domestic production of orange, with a primary focus in juice production, both for domestic market and for export, then the banana, the main fruit fresh *consumption* in the country, and grape, with demands for the production of wines , juices and fresh *consumption* (Oak and Miranda 2009).

The mango production reached 1,189 tons in 2010, registering a 6.5% decrease if compared 2007 volume (Ibge 2011). However, Brazil had an increase in production of 200% between 1999 and 2007 (Carvalho and Miranda 2009). Therefore, when analyzing the past decade, Brazil has experienced significant growth in mango production.

Mango is cultivated in several Brazilian states, but there is a concentration on two poles - the state of São Paulo and the Vale do Rio São Francisco, the semi-arid region in the state of Bahia and Pernambuco. The poles are responsible for 77% of national production, 18% in São Paulo and the Vale do Rio São Francisco with 59%. Besides being the main hub of mango production, the Vale do Rio São Francisco is the largest exporter of mango in Brazil, with $ 137 million in 2010, 90% of mangoes exported (Ibraf 2011).

Brazilian mango in US

In Brazil, agribusiness has generated £ 918 million in 2011, representing 22% of GDP. Although agribusiness has suffered a drop in revenues in 2009, affected by the international crisis, Brazil

has been expanding its exports in the last four years (Secex, 2012). Between 2010 and 2011, the main sectors, soybean complex, sugarcane and meats, recorded an increase of exports, leading Brazilian agriculture to a gain of 11.8 billion dollars in the period, reaching US $ 94.6 billion in 2011 .

Accompanying the oscillation of Brazilian agribusiness in the international market, the fruit fell by 16% in revenues in 2009 and since then has increased volume and revenue reaching $ 940 million in 2011, representing 3.7% of the agribusiness volume (Secex, 2012). Mango, the third largest fruit export platform national, fell by 18% in 2009, despite the significant growth recorded between 2000 and 2008, when it duplicates its billing. In 2010, exports of fruit were $ 119 million, the highest level in four years.

In the export of Brazilian mango, is mainly concentrated to the Europe and USA markets. There is a window for Brazilian exports to the US between the weeks thirty-one and forty-seven, ie, the months from August to November. The peak of Brazilian exports to the United States coincides with the peak of the harvest in the field, being between week forty and fifty, that is, between the months of September and December.

Historically, the main destination of Brazilian mangoes is Holland. The United States is the second, with imported volume of 25 tons of mangoes, 11% of national exports (Secex 2012).

Among the largest exporters of Brazilian mango in 2011, are Finobrasa, Umbuzeiro, and Agrodan Ibacem, representing one third of the total volume exported in the period. It is noticed a predominance of companies from northeast, mainly from the Vale do Rio São Francisco. All companies exporting to the U.S. also exported to Europe, but the opposite does not occur.

According to interviews with key informants, the export of mangoes to the United States is made only for shipping and refrigerated containers due to product perishability. There is only one route of travel to the east coast of South America and the east coast of North America. The shipping service is offered by two multinational companies in marketing alliance, *joint venture* model. That is, there is a monopoly in the transport service used to export the Brazilian mango to the United States.

According to key informants, the U.S. market does not have much demand for refrigerated container compared to Europe, since the U.S. does not usually buy beef, pork and chicken from Brazil (representing 70% of national export platform refrigerated). Therefore, the charge cooling competes with dry cargo ship for the space in the Brazil-United States route.

Brazil exported to the United States 24,588 tons of mangoes in 2011, establishing a growth of 7% over the volume shipped in 2009. (National Mango Board 2012). On average Mexico has 65% of the total volume exported to the United States between 2009 and 2011 and Brazil, in fourth position, has 7%.

Among the types of mangoes imported by the United States, there is a concentration of six varieties that account for 99% of total volume (National Mango Board 2012). Each type of mango has a characteristic flavor, texture, color that determine the price and volume of demand. According to key informants, Brazil focuses its exports in Tommy Atkins due to good productivity, resistance to hot water treatment on post-harvest shelf life and looks good compared to other varieties. For these reasons this variety is most common among suppliers.

The different variety of mango, the asymmetry of the climate in the northern and southern hemispheres and the use of technologies such as irrigation and agrochemicals, allow the U.S. to be supplied constantly during the twelve months of the year. The annual cycle of the

mangoes is divided into two seasons in the U.S., the first formed by the seasons of spring and summer and the second by the autumn and winter. Both seasons overlap to ensure supply throughout the year, with 70% of the total volume of imported mango being concentrated in spring/summer. The Brazil begins its export window in August, intensifying the arrival of volumes in September and October and reduces exports in November.

A determining factor for exports of Brazilian mangoes to the United States is to meet the sustainability criteria required by the US trading companies.According to the National Mango Board (2012), the best sustainability practices in the mango industry are the measures that the participants in this industry can adopt in order to minimize their share of impact on the environment.

Supply chain of mango (US-Brazil)

According to Costa (2006), the supply chain of the mango is divided into four parts: pre-harvest, harvest, post-harvest and marketing.

The pre-harvest is constituted by agricultural management - set of practices designed to ensure the productivity and quality of fruit in the field. According to key informants, the activities of this phase are: fertilizer, panicle cleaning, thinning, application of calcium hydroxide, application of agrochemicals and watering. During the pre-harvest, the plant absorbs nutrients from the soil, performs photosynthesis and prepares all the quality of the fruit. The Brazilian mangoes sold in the United States are harvested at maturity so they can withstand the steps of post-harvest handling, required to take them from the production areas to the retail market.

The next stage is to harvest fruit in which the plant to be removed is selected according to the extent of maturation and the latex is removed. Due to the seasonal nature of culture, it is common during harvest the utilization of skilled temporary workers. To be harvested, the fruit begins its process of senescence and no quality will be incorporated. After harvesting, all subsequent post-harvest processes designed to maintain the fruit quality was generated while this is still not picked off. If the mango is harvested before the ideal point of maturation, the flavors and scent will not reach the full potential of the fruit and, probably, the mango will be of low quality and more susceptible to damage caused by low temperature (Brecht *et al.* 2011)

The post-harvest begins with the transport of the sleeve to the packing house - in which there are processes for receiving, cleaning, sorting, treatment plant, packaging, pre-cooling, storage and stowage on container (Costa 2006) .

Before the fruit is discharged, a thorough exam is done in the plant documentation accompanying the load and in accordance with the protocols established by the government, a sample of the fruit is examined for any evidence of infestation by fruit-fly, which is an important quarantine pest of mango crop. The fly lays eggs inside the fruit and larva, to develop, causes a hormonal imbalance in the mango, resulting in uneven ripening and subsequent necrosis in the affected region. If evidence is found larvae of the fruit fly, the load is rejected. Besides the quarantine for the control of insects, it is the control to assess the ripening of fruits and detect defect in the wrapper before reception, in order to ensure the quality of the mango (Brecht *et al.* 2011)

Inside the house packing, fruits are discharged in tanks with water to remove the heat absorbed in the field and for removing the earth, latex and other waste materials that may be

adhered to the fruit. After this process is transferred to the line classification by size (weight or measure). To meet USDA standards, the packing house must follow the protocols of Health Inspection Service and Plant Protection of Animals and Plants (APHIS) for categories of size and measurement accuracy.

Following the protocol, the mangoes are pushed to the hot water treatment for quarantine security. According to key informants, not just any farm that can export to the United States, since the USDA requires the application of heat treatment on the fruit. This treatment is costly, and also requires the physical presence of an inspector from the U.S. government, which is also paid by the Brazilian exporter. That is, investments are needed in structure and infrastructure that will be used for only 3 months in the year. Mercosur countries also require heat treatment, which may contribute to the dilution of costs with the structure of treatment, but this volume is not significant.

According to key informants, still in box packaging is made from fruit sorting and removal of defective / damaged. This procedure is designed to eliminate wasted time, money and energy in the order for fruit unmarketable to the United States, which will eventually be removed from pallets and boxes discarded. Then the application of wax is made on the shell of the fruit in order to increase brightness and reduce water loss which causes the sleeves to lose commercial value.

With this, the fruit goes to the packaging meeting the recommendations for labeling, ie, identify the product (variety), fruit number, net weight, country of origin, producer, packer, conveyor / exporter, traceability code, number Certificate of hot water treatment and contact APHIS responsible in the United States. Once packaged, the mangoes are palletized, precooled and packaged in refrigerated room with a temperature between 10 ° and 12 ° C, to be placed in containers for transport to the port (Brecht *et al.* 2011).

According key informants, for quality control, a representative sample of each lot should be kept in cold storage while the remainder of the batch is transported to the United States and until it is delivered to the buyer. Such procedure allows packer to compare fruit quality under ideal storage conditions and quality of fruit ripening and shipped, thus allowing the packer to have evidence to understand the variation in the quality of the fruit reported by recipients that are inherent in the product or resulting from transport, and help the exporter to verify if that quality changes in receiving the mango are consistent and accurate. before closing the containers, temperature recorders are placed along the load whether the load was maintained mangoes in transport temperature desired.

The stage is constituted by marketing operations after the departure of the load of the packing house (Costa 2006). The product is transported to the port, boarded ship and ends at the port of destination abroad. When cargo is unloaded, the fruit is inspected to check their physical condition and phytosanitary measures. According key informants, that assessment is needed for the classification category and the release of the batch of mango in the destination country, serving also as subsidy to importers to pay according to the quality of the product received. The fruit goes to the importer and discharged when the mango is collected temperature sensors and the load goes to the quality inspection of the importer, which determines whether a fruit is accepted or rejected, as well as their potential use. With this, the pallets are stored in cold storage until they leave transported in trucks, often chilled.

Upon reaching the retailer, it is performed an inspection for quality control. Retail stores keep a stock bag in a cold room for 2, 3 or 4 days. The product storage in cold store retailer is the last step in the cold chain for mangoes (Costa 2006). Maintaining a proper temperature control until the moment when the sleeves are exposed for sale at retail has a positive effect on the shelf life of fruits, minimizing wilting, mechanical damage and water loss, and contributing to the shops retailers make the most sales (Brecht *et al.* 2011)

According Caniato and Rice (2003), terrorism is a threat to the United States, and import for navigation is a source of risk to the safety of the country, mainly because of possible changes to the product during shipping. Therefore, all containers of Brazilian mango shipped to US are inspected and sealed by USDA and MAP inspectors off the farm and will only be opened by other tax upon arrival at the U.S. port.

Main threats to the competitiveness of Brazilian mango

The use of floral induction technology developed by the Brazilian Agricultural Research Corporation (Embrapa), allows regular vegetative growth hose outside their natural cycle. Associated with irrigation, ample availability of land, good water and hand labor abundant, the production of the Vale do Rio São Francisco can have an early cycle in relation to the natural plant and high levels of productivity. The technique ensures the blooming year round, and this advantage is reflected in the foreign market, since the Brazilian mango can cater to the consumer market throughout the year, including in other countries between harvests when prices are higher (Buainain and Battle 2007).

According to key informants, the price varies with the demand of the foreign market. During the summer the United States, the window period of Mexican exports, demand for mangoes is greater than at other times of the year, which tends to raise the price of the product. However, the volume of fruit is so great that Mexico has paid a low price for their fruit. At that time, the supermarkets tend to do sell mangoes. At the end of the summer in the United States, the Mexican crop production is declining, however, the market is still active in receiving the fruit, so the goods became scarce, so the price rises, and only Brazil has the fruit to ship to the United States. By the end of the export window Mexican fruit has good quality, especially as regards the lack of staining, thus, the price of the Brazilian mango are enhanced since they are characterized by being a well colored fruit.

According to key informants, the key attributes of quality in the United States are color, cleanliness and no surface damage. The preferred range in the U.S. market is due to the visual appeal Thommy - coloring. This variety combines with exports to the United States because its production is possible in the window market in which there are no other producing countries, and this does not occur with other varieties such as Kent.

To bring the fruit to distant markets, farmers harvest the fruit with a low degree of maturation, impairing the quality potential that it could get, and leverage potential damage caused by the heat treatment. To take advantage of the high prices, producers end up picking fruit before ripening stage and appropriate export a green product without quality.

According to key informants, the Brazilian producer knows well the risks of agriculture (climate, soil, pests, among others) and copes well with the risks inside the gate. The main concern is the producer of mango ensure the quantity to be produced. If profitability is well below expectations, control of production costs becomes the main concern. However, the

researcher at Embrapa in agricultural economics says that the factor that has determined the financial gains of mango production is the price obtained for the product (US$/tonne) and not the methodical control costs.

According to key informants, when there is a lack of product on the market, any mango is sold and gets good price, but when the market is high with mango supply, the price varies according to quality. In extreme cases of excess fruit in the market, the producer sells the fruit in the market or, if you can not pay a price for their harvest costs, leaving the fruit on foot. A large amount of ripe fruit left on foot leads to the proliferation of fruit flies that once proliferated, tends to attack future crops. The occurrence of fruit flies in only one fruit (whatever the stage of the supply chain) causes that the entire batch is rejected. This insect is the motivator of the existence of hydrothermal treatments for fruit, mandatory procedure for export, which may impair the quality of the sleeve, increase costs and decrease productivity in processing.

To avoid fruit flies and meet international quality standards, must meet the requirements of certifications. The certification give value to the the product when it arrives on the shelves of the importing country, there is no product differentiation certified or not. The marketing of mango in foreign markets can occur even with a poor quality fruit that met the certification.

The Brazilian government, through Embrapa and Sebrae, prepares farmers to adapt to the standards of certifications. The certification is a prerequisite for export of mango. An example is the USAGAP, North American protocol that describes product traceability, good agricultural practices, the proper use of pesticides, preservation of environment, health, safety and welfare of agricultural workers.

Final considerations

In short, there are many risks that can interfere decisively in the competitiveness of the chain Mango. According to the informants of supporting organizations, the potential risks and limitations of manga Brazilian exports are:

• Expressive internal market - has the capacity to absorb much of the fruit produced in the country;

• Low regularity of supply of product in the international market, making it difficult to settle short and long term agreements;

• Poor infrastructure and logistic efficiency in roads, ports, airports, among others, endearing and delaying flow of products;

• High tariffs and taxes;

• imposition of phytosanitary barriers, mainly by USA;

• exchange rate volatility - which can compromise the financial gains in the sale and make the purchase of imported raw materials that are used in the production more expensive, and may change the value of packaging used in the pos harvest;

• International crises - reduce demand;

• Distance from importing countries - the fruit has a short lifetime and with the passage of time, the quality decreases;

• High cost of production and competition with other countries who have low cost of production;

• Reduction of Brazilian exports window, while other exporting countries expand their periods of the harvest;

• Heavy rains between February and march in Vale São Francisco, which can increase the spread of anthracnose and, consequently, decrease the quality and volume of fruit to be exported;

• Oversupply of Brazilian fruit in the United States;
• Consignment Sales;
• transactions without contracts and guarantees;
• Lack of information systems;
• Concetration in only one mango variety;
• The cost of imported raw materials;
• poor logistics infrastructure - it is not agile and increases mango's price;
• producers are not united.

Furthermore, according to the interviewees, there are some aspects inherent to mango product that hinder export, requiring agility and low failure rate in the supply chain. Because it is a living organism, fruit breathes, emits gases (CO2 with ethylene) and its lifetime varies with temperature, humidity, attack by pests, microorganisms, bacteria, viruses and mechanical injuries. Therefore it is necessary to take special care to the product in order to maintain the quality of the fruit from the field, ensuring a healthy and tasty fruit, past the delicate crop without causing mechanical damage to the marketing of a safe quality product. Unlike most agricultural products, time to market the fruit is very short, so the logistics must act quickly to deliver the product to the consumer, be flexible enough to meet sudden provacadas crops by time or even be able to cancel shipments due to loss of products damaged by rain or by pests.

Although technologies of agricultural management and climate provide competitiveness for Brazilian mango, product characteristics, management and operations along the chain can cause failures and disruptions in the flow of export product.

According to the this research findings, the risks are divergent among members of the global supply chain of mango. The exporter is the most penalized by the consequence of a risk to the chain studied as a whole. Members involved in relationships are more affected by the global chain risks than the other members, as cited by Braithwaite (2003) and Christopher and Lee (2004) on the increased vulnerability of global transactions.

The exchange variation and dependence on a single shipping are the main risks to the supply chain. Confirming Manuj and Mentzer (2008b) remarks on the exchange and dependency among the most important risks in global chains. Through the analysis of the impact of the main risks in all members of the supply chain, we observed a higher intensity of threats to demand, supply and sustainability of the exporter and importer.

References

Christopher, M., Peck, H. 2004. Building the Resilient Supply Chain. *International. Journal of Logistics Management*, 01.

Christopher, M., Mena, C., Khan, O., Yurt, O. 2011. Approaches to managing global sourcing risk. *Supply Chain Management: an International Journal*. v.16, n.2.

Jüttner, U. 2005. Supply chain risk management - Understanding the business requirements from a practitioner perspective. *International Journal of Logistics Management*, v. 16, n. 1.

Jüttner, U., Peck, H., Christopher, M. 2003. Supply Chain Risk Management Outlining an Agenda for future Research. *International Journal of Logistics: Research and Applications*, v. 6, n. 5.

Khan, O., Burnes, B. 2007. Risk and supply chain management: creating a research agenda. *The international journal of logistics management*.

Miles, M.B., Huberman, A.M. 1994. *Qualitative Data Analysis*. 2ed, Thousand Oaks: Sage.

Norrman, A., Lindroth, R. 2004. Categorization of Supply Chain Risk and Risk Management. In: Brindley, C. *Supply Chain Risk*. Hampshire: Ashgate.

Paulsson, U. 2004. Supply chain risk management. In: Brindley, C. *Supply Chain Risk.* Hampshire: Ashgate.

Peck, H. 2003. Building the Resilient Supply Chain. *International Journal of Logistics Management*. 01.

Peck, H. 2000. Drivers of Supply Chain Vulnerability: an integrated framework. *International Journal of Physical Distribution & Logistics Management*. 01.

Rice, B., Caniato, F. 2003. Supply chain response to terrorism: creating resilient and secure supply chains. *Supply Chain Response to Terrorism Project Interim Report*, MIT Centre for Transportation and Logistics, MIT, MA. 01.

Sheffi, Y. 2005. *The resilient enterprise: overcoming vulnerability for competitive advantage.* Cambridge: The MIT Press.

TANG, C.S. 2006b. Perspectives in supply chain risk management. *International Journal of Production Economics*.

Tang, C.S. 2006a. Robust strategies for mitigating supply chain disruptions. *International Journal of Logistics: Research and Applications*.

Voss, C., Tsikriktsis, Frohlich, M. 2002. Case Research in Operations Management. International Journal of Operations & Production Management. Vol: 22, p.195-219.

Zsidisin, G. A.. 2004. A grounded definition of supply risk. *Journal of Purchasing & Supply Management*, 2004.

Zsidisin, G.A., Ritchie, B. 2008. Supply Chain Risk Management – Developments, Issues and Challenges and Performance. In: ZSIDISIN, GEORGE A.; RITCHIE, BOB. *Supply Chain Risk – A Handbook of Assessment*, Management and Performance, 2008.