Driving the Demand for Mangos with the National Mango Board

National Mango Board
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www.mango.org

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In 2008, the National Mango Board (NMB) initiated a program to collect and analyze consumer data on household purchases of fresh whole and cut mangos. Before that time, there was little definitive information about the consumer base and what drove U.S. households to purchase mangos. The Board now has six years of consumer information that documents much about the households and their buying behavior. These data include households who did and did not buy mangos in a particular shopping period (shopping within a two-week window). These periods correspond to calendar months starting with February 2008.

Since we know the shopping behavior of households and not just households who purchased mangos, much can be learned about what drives demand and why a particular family did or did not buy mangos. Also, the same information is recorded for an additional 13 fruits thus enabling a comparison of mangos to other fruits generally located in similar sections of most grocery stores.

These data have been used to provide a general description of buying patterns and give the database for estimating the demand for mangos. Statistical models have been developed to measure the impacts of major factors impacting the demand for mangos. A factor of primary interest is the NMB's generic promotion impact on the

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demand for mangos.

Continued existence of the NMB is based on the generic program's ability to enhance the demand for mangos. With the statistical models and the ongoing data collection, the economic impact of the NMB programs has been estimated using scientific data analysis tools.

As described several times in a series of reports to the Board, total demand is a product of the number of households (Hwd) times the percent of those households who purchased mangos. That percentage has consistently been denoted as *market penetration (MP).* Then among those mango buyers, one knows the number of whole mangos purchased and the price paid. The number of mangos per buyer has been consistently referred to as *market intensity (MI).* Total demand equals Hwd × MP× MI. The number of households is easily predicted over time. There simply is not a lot of month-to-month variation in the population except for a general growth trend.

When a product is well known and a substantial component in the diet, the expectation is that the percentage of households buying is fairly high and generally stable. Likewise, the number of units per buyer will be more stable and closely tied to the storable characteristics of the food. Clearly, mangos are perishable and that perishability influences the number of mangos per buying occasion. Promotions could influence both market penetration and market intensity but the initial expectation was that the impact would be mostly on the percentage of households buying mangos, again if the programs had an impact.

As part of the enabling legislation authorizing commodity checkoff programs such as the NMB, those paying the assessments and those responsible for oversight must have reliable measures of the program performance. One such measure is the return-on-investment (ROI). For commodity boards, an ROI measures how much additional revenues were created from the generic promotion programs. If that measure indicates success in enhancing demand, then more insight into the details is justified. Without going into all of the analytical methods, we will now turn to those measures starting first with the overall impact measure. Since assessments are collected at the equivalent FOB level (i.e., import into the U.S.), all impacts are eventually expressed in gains at that level.

Major Demand Patterns in the Demand for Mangos

Figures 1 through 4, at the end of the report, capture four major demand patterns that provide an overview of mango demand from 2008 forward. These patterns are based on scientific statistical analyses for over 75,000 household data points covering the months from February 2008 through July 2013. The single most important statistic for the mango industry is the change in market penetration set forth in Figure 1. Many demand factors are at play in changing market penetration (i.e., percent of households buying mangos), yet in total it is perfectly clear that over the six-year period, market penetration has shown a strong positive statistical trend. The trend has risen from under 3 percent to over 13 percent in 2013. There is substantial seasonality in demand, yet the peaks have risen and the troughs are sightly

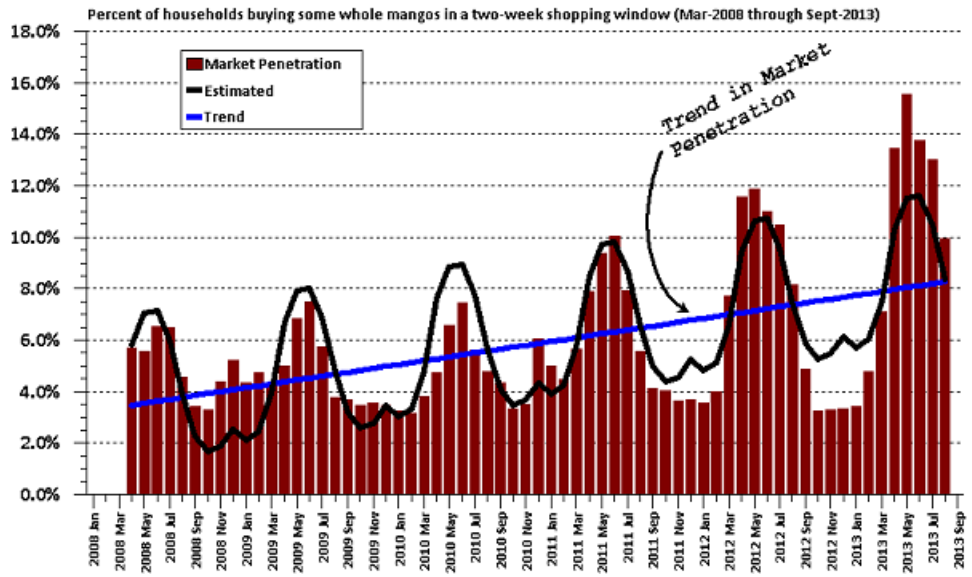

Figure 1. Market penetration in the U.S. demand for whole mangos.

less. The seasonal lines contrasted with the bars depict the statistical models estimates of market penetration and, clearly, the model captures most of the growth and seasonal demand trends. The linear plot depicts that growth with the seasonal factor removed. Starting with 2008, the signal of growth in market penetration is undisputable. A fundamental question is what role did the NMB play in contributing to that growth in market penetration? The answer will be revealed later in this report.

Once the decision to buy is made, the actual number of mangos purchased dictates the total demand. In Figure 2, the average household buyer will purchase 2.73 mangos per buying occasion. Early in the survey years, there was considerably more variation in the numbers but as readily apparent since 2009, the market intensity or mangos per buyer became more stable. In fact, between 2010 and 2013 there is almost no trend in the market intensity with the numbers remaining very close to the

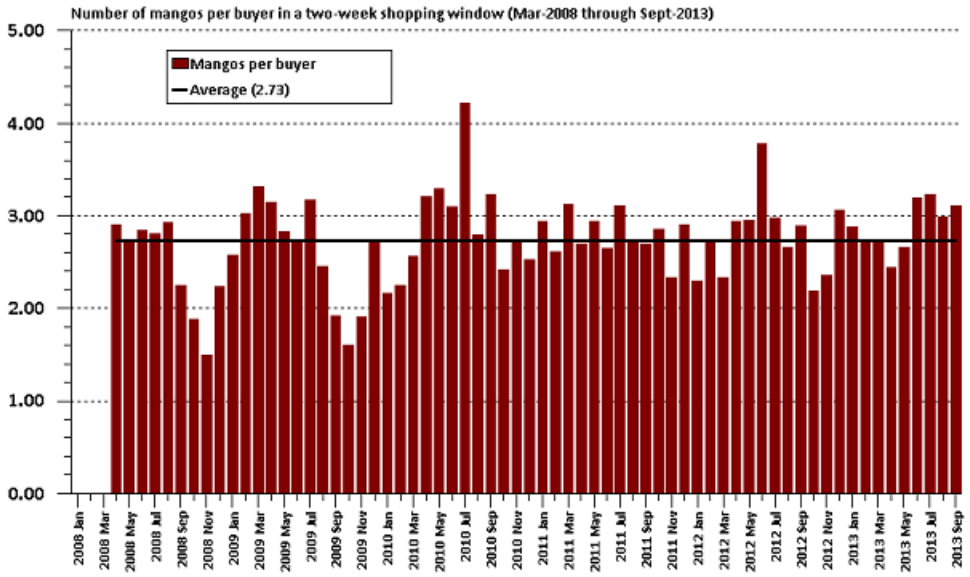

Figure 2. Average number of mangos per buyer in a two-week shopping period.

2.73 average.

Price paid per mango in Figure 3 shows the actual cost to the consumer with the average being $1.11 per mango. There is some seasonality in prices and a slight growth in the price paid over the survey period. Yet both the price and market intensity show minimal change when compared to the market penetration growth. Basically this tells us that when looking at changes in the retail value, most of that change comes from attracting households to purchase mangos (i.e., from market penetration). As with most foods experiencing growth in the consumer base, sustaining that initial growth rate generally becomes more challenging. Part of the overall evaluation must be to monitor the incremental changes in both the percentage of households buying mangos and the numbers of mangos per buyer. Any changes in the household buyer behavior suggest new program opportunities for the NMB.

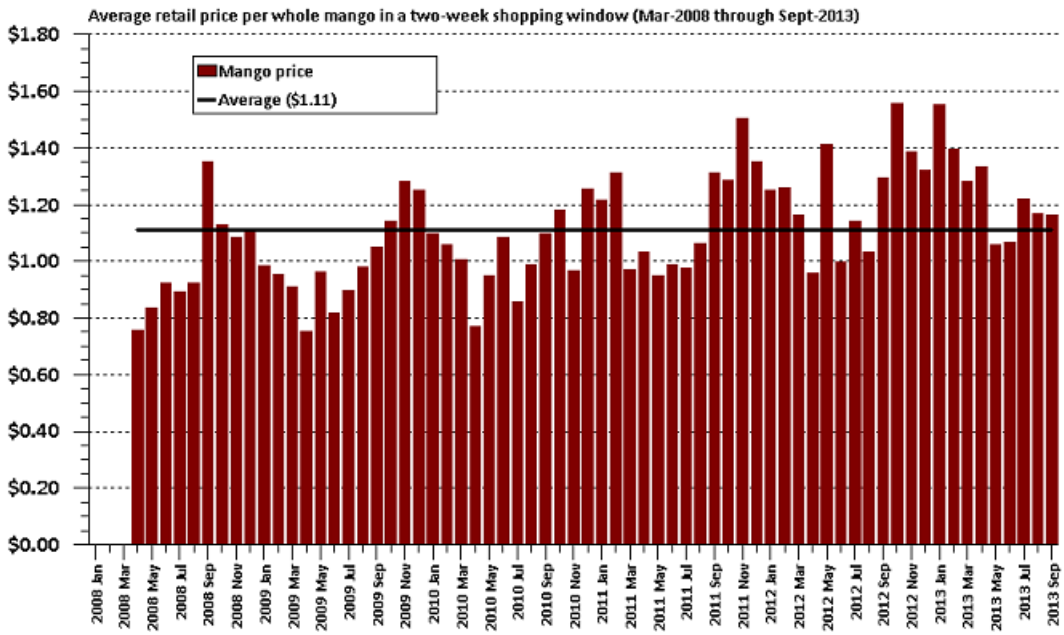

Figure 3. Average price per whole mango paid per buyer.

In Figure 4, we have calculated the retail mango market value and the positive growth in value is pronounced. The trend line points to a growth from around $40 million in the summer of 2008 to over $80 million in mid-2013. That is more than a doubling of the retail value. At this point with Figures 1 through 4, the basic trend is overall growth in U.S. demand for mangos both in volume and economic value.

It is also insightful to see the mango industry relative to demand for other fruits often displayed in similar areas as mangos in food outlets. Since almost all fruits are unique in their attributes and size, comparing volume sales is not very meaningful. A useful way for comparison is to show the mango share of the dollar sales based on a selected set of fruits reported in the database. Within the NMB

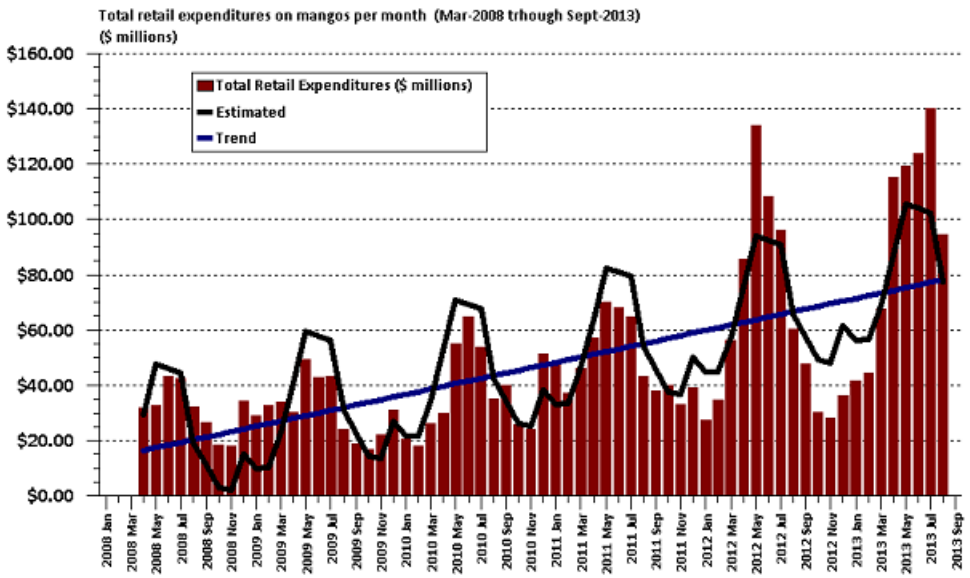

Figure 4. Monthly retail expenditures on whole mangos.

household survey, respondents were asked to record their purchases and prices paid for 13 additional fruits. Hence, we know the household expenditures on 14 selected fruits including mangos. Granted, this is a limited set of other fruits so the mango share of total expenditures is inflated relative to a larger set of fruits. Even with the possible inflated share, any trends in mango share of that subset of fruits should give insight into relative demands over time. In Figure 5, mango share of the retail dollars for this group of 14 fruits is plotted along with the estimated share and a growth trend. Figure 6 shows the 14 fruit shares. Within this subgroup of fruits, mangos share of the dollar value has increased from around 2% to nearly 9% in the later part of 2013. The growth is pronounced even if that actual share level is being based on a subset of fruits. While not shown in Figure 5, the biggest share losses are found for apples, bananas and oranges. Like that from Figure 4, the upward trend in

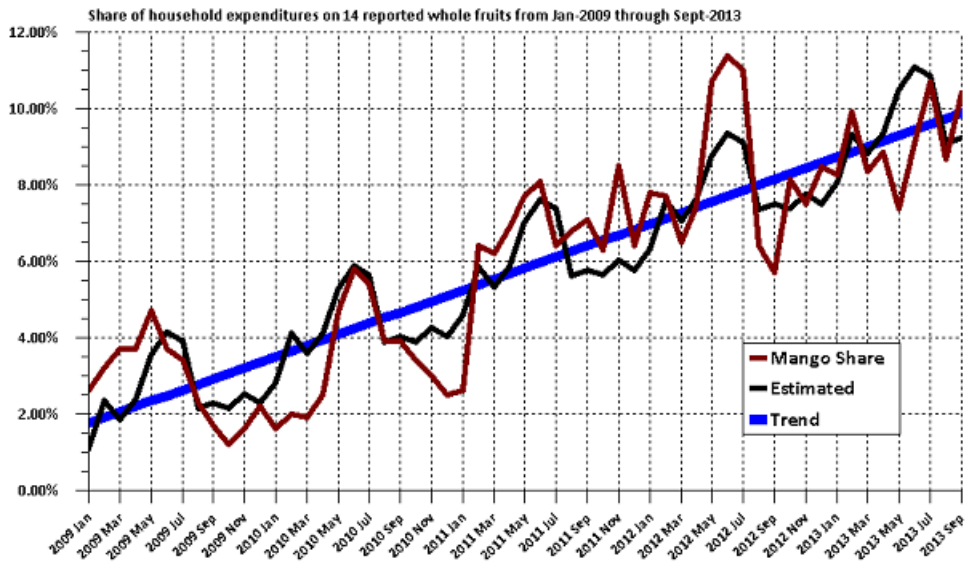

Figure 5. Market share of retail dollars spent on selected set of fruits.

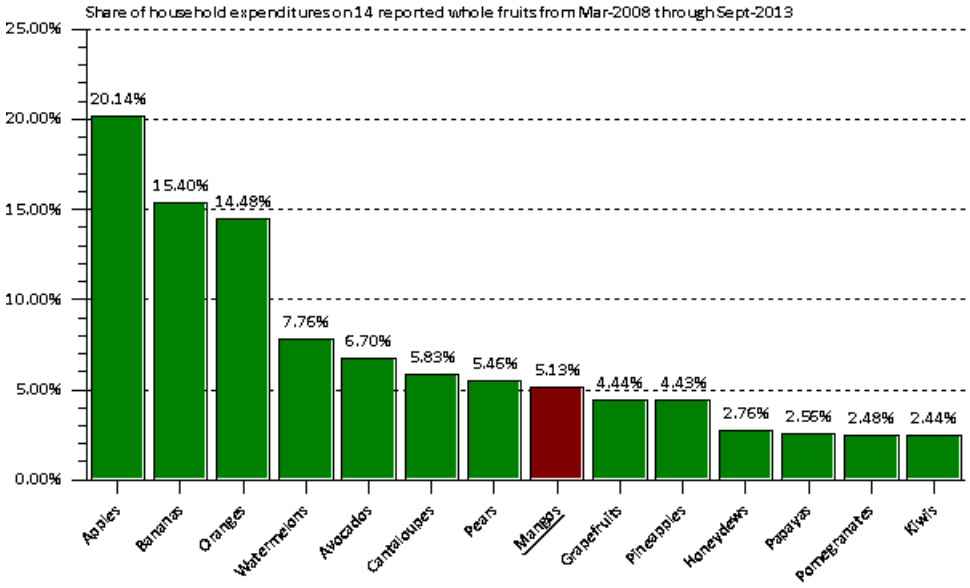

Figure 6. Market share of retail value of 14 selected fruits.

mango's share of the fruit market provide another positive signal for the industry to judge the overall viability of the U.S. market for mangos. For the full study period, mango share of the retail value averaged 5.46% of the household expenditures on the selected fruits. Distribution of the shares across the subset of fruits is shown in Figure 6.

Awareness of the National Mango Board Programs

For the NMB to have contributed to the growth seen in both Figures 5 and 6, potential consumers must first be aware of the programs in some form. Only then would one expect to see a measurable impact on mango demand. Quantifying awareness cannot be obtained from public data sources. Hence, as part of the ongoing consumer survey, new questions about "awareness of promotions" were included in the questionnaire. Households were asked if they recall seeing any promotions about mango as well as for those other 13 fruits and a few vegetables. They were also asked to identify the sources of information such as TV, in-store displays, magazines, etc. Another measure of awareness is to record hits on the mango website. Generally, programs like the NMB use many different media outlets with the message having a common focus even with different targeted audiences. Likewise, a large share of the total effort is through print media, again channeled to selected print outlets that are often demographically targeted.

For the months from February through September of 2013, 7% of the survey respondents indicated some awareness of mango promotions. For comparison,

awareness of banana promotions was 19% and 6.2% for pears. Among those households aware of mango promotions, they were asked to indicate the sources of information. Of these households, 40.1% listed in-store promotions as the most frequently listed source. The percentages dropped quickly with newspapers registering 17.3% and pamphlets/mail-in, 13.6% as shown in Figure 7. The remaining sources were all under 7% as illustrated in descending order with the horizontal bars in Figure 7. Newspapers, pamphlets and magazines combined totaled around 37% while television was under 5%. The menu source in Figure 7 should be reflecting mostly food service sectors.

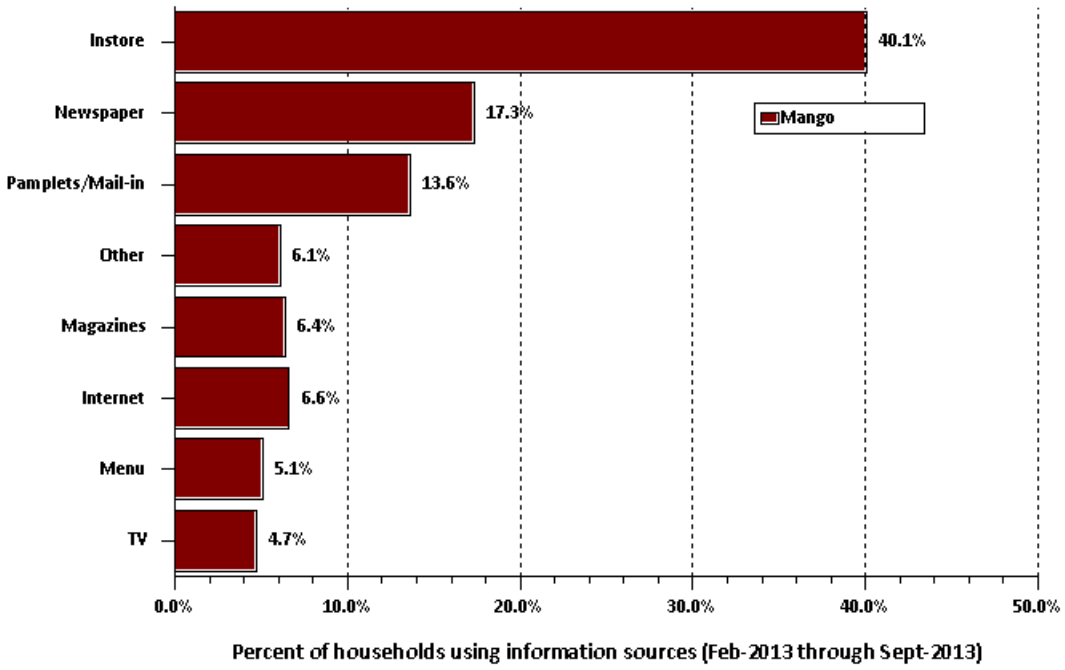

Figure 7. Household sources of information about mangos.

The internet is obviously a growing tool for consumers of almost all products. Around 6.6% of the households indicated using the internet to find information about mangos. Likewise, 3.4% of the households actually went to the NMB website and on average almost 50% indicated they downloaded something from the website. The percentage visiting the mango website (i.e., www.mango.org) is generally on par with most of the other fruits included in the questionnaire. Apples had 6.7% while most were in the same range as mangos. Also, it is not usual for households to download when they visit a website so the percentage for mangos is about the norm for most of these websites.

Measured Impact of the National Mango Board Programs

Awareness of promotions does not necessarily translate into changes in demand. Given that households indicated a level of awareness, the question then is if that awareness from all of the sources leads to enhancing the demand for mangos. Demand models were estimated where the potential impact of the NMB programs could be statistically measured. One model estimated the impact of the NMB programs on market penetration (MP) and another, the impact on market intensity (MI). These potential impacts were estimated while accounting for the other major demand drivers such as prices and demographics. The overall conclusion is that the mango promotions were highly successful in attracting new buyers to the marketplace (i.e., increasing MP). Yet, those same programs had little impact on the number of mangos per buyer (i.e., MI). Estimating the average market penetration over the period

from March 2008 through July 2013 gives a MP value of 5.98% with the programs in place and 4.65% without the NMB. That is 1.3 percentage points higher that is directly attributable to the NMB. In the more recent years, the percentage points are even higher. For example, between August 2012 through July 2013, estimated average market penetration was 7.83 with and 4.91 without the NMB. Clearly, the effectiveness of the programs has improved over time.

In direct contrast, the average number of mangos per buyer with and without the NMB remains very close to 2.7 mangos per household in a two-week shopping window. This tells us directly and statistically that any gains attributed to the NMB must be attributed to market penetration and not market intensity. Furthermore, there is considerable seasonality in both measures as would be expected and particularly with the market penetration.

As noted above, total demand is a product of MP times MI given the number of households at a point in time. Also, the total number of household grows gradually over time and that growth is factored into the estimates of total demand initially shown in Figure 4. Given we now know the impact of the NMB programs on both market penetration and market intensity, what would be the demand with and without the market enhancing programs? Figure 4 reflects sales at the retail level but assessments are at the point of imports. Hence, to gain insight into the impact of the programs, those sales need to be expressed at the same FOB point of entry into the U.S. A good rule is that the FOB price is 34% of the retail price and that conversion factor can be used to express the retail value at an equivalent FOB level. Using that

factor, total retail sales from Figure 4 are converted back to the FOB level.

For the periods from March 2008 through July 2013, the total retail value was estimated to be $3.106 billion. With the 34% conversion, that gives a cumulative total of $1.056 billion at the FOB level for the same periods. In Figure 8, on the upper right part of the chart you can see that FOB value. That value is estimated including the impact of the NMB. Chart (A) in Figure 8 depicts the cumulation totals starting with the period March 2008 through June 2010. For example, through June 2011, the total FOB equivalent sales were $522.34 million. Next in Figure 8, the lower green area in chart (A) shows the estimated cumulative dollar sales without the NMB impact. By July 2013, those sales totaled $818.56 million. The area between the total sales with and without the NMB represents the gains directly attributed to the NMB programs. Again, these are all cumulative values starting with the period March 2008/June 2010. Almost all of these gains are a result of changing market penetration and not market intensity as discussed earlier.

Chart (B) of Figure 8 shows the cumulative gains at the FOB equivalent level. By July 2013, those gains totaled $238.32 million. That is, the industry realized $238.32 million in FOB value that would not have been realized in the absence of the NMB programs. During those same periods through July 2013, the NMB spent at total of $22.04 million in all of its programs.

The bottom chart (C) in Figure 8 provides the return-on-investment (ROI) based on the gains shown in chart (B). A total of $22.04 million lead to the estimated gain of $238.32 at the FOB level. Expressing those gains per dollar of expenditures

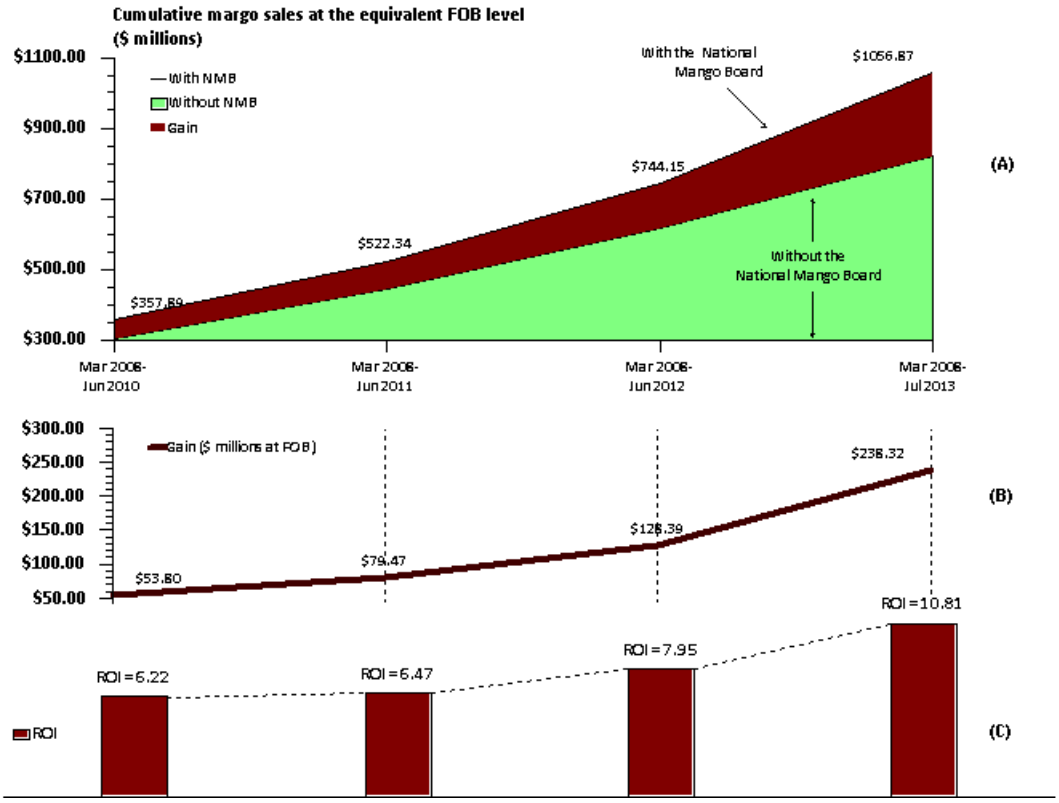

Figure 8. Estimated impact of the National Mango Board programs.

is the ROI, the most frequently used indicator of performance among commodity boards. Using the cumulative gains ending with July 2013, the ROI is 10.81. That is, for each NMB dollar spent, the industry realized an additional $10.81 in gross sales that would not have existed otherwise.

Chart (C) shows how these ROI estimates have changed over time. Through 2011 using the revised models, the ROI was 7.95. Comparing that value to the ROI across the periods reported, an upward trend in the ROI is most apparent. Based on the analyses to-date, the effectiveness of the programs per dollar invested is improving. Knowing the ROI is essential to monitoring the programs and, likewise,

following the directional movement in the ROI is equally important. The positive trend is a strong signal of the effectiveness of the overall NMB programs and a plot such as shown in Chart (C) is a useful way for visually tracking the programs.

Why Do Households Not Buy Mangos?

Given the levels of market penetration shown in Figure 1, there are obviously many households who do not purchase mangos, at least within the two-week shopping window. Even with the positive impact of the NMB, the percentage of households not buying is still substantial. If one can identify some of those major reasons for not buying, that could give direction to channeling programs into possibly unexplored areas to nudge potential buyers. Also, there may be a segment of the population who simply does not like mangos. That type of perception would be difficult to change. Whereas, households simply not knowing about mangos could be more easily changed through the various media identified in Figure 7.

As part of the overall household survey, responding households were asked to indicate their reasons for not buying. In Figure 9, those reasons have been ranked from the largest percentage to the lowest. Note that a household could list as many as appropriate. The top reason was a "dislike for the taste of mango" and that perception is probably difficult to change without providing ways to experiment with various uses of the fruit. It could also be due to a bad experience with quality. In contrast, the second and third main reasons related to awareness and state-of-mind. Both reasons are potential targets for promotional information since they can change the potential

consumers' minds through awareness. Fourth and fifth on the scale are prices, both of which the NMB has no role. The remaining reasons have smaller importance but cumulative changes in these could have a substantial impact on mango demand. Particularly note the cutting and preparing concerns. Those types of issues immediately lend themselves to educational messages as has been used in several promotional media.

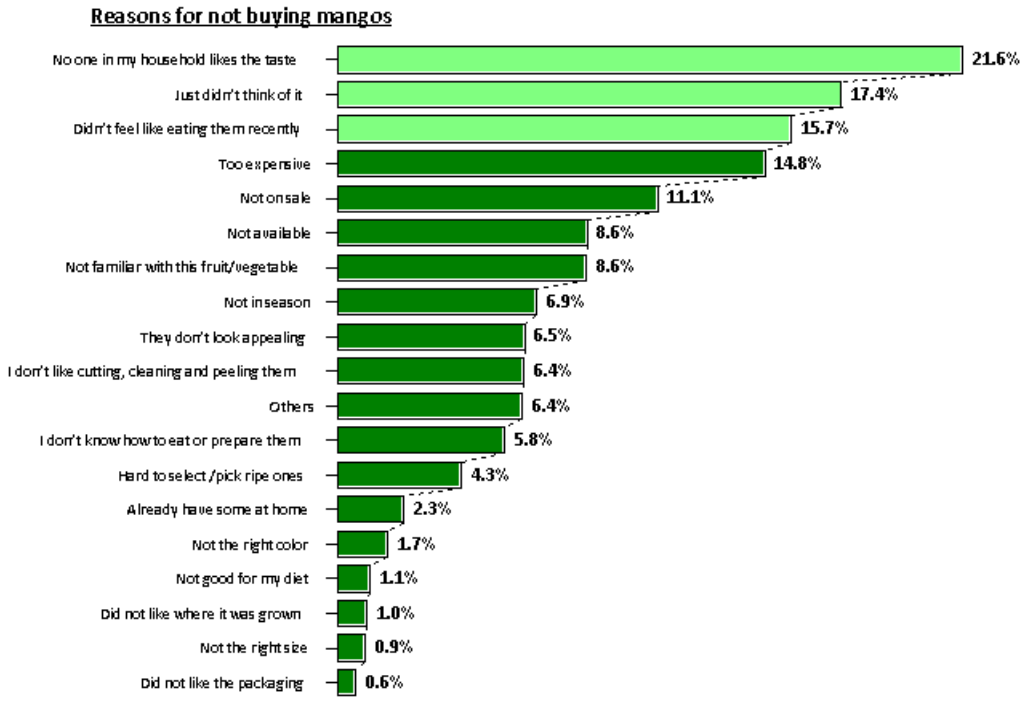

Figure 9. Reasons for not buying mangos.

These same households were asked to give their top reason for not buying mangos contrasted with all of the reasons listed in Figure 9. Recall in Figure 9 that each household could include as many of the 19 reasons in Figure 9, while in Figure 10 we are showing just the percentage for the top two primary reasons. Since the

survey extends back to 2008, an interesting number would be to see if there was any progress in reversing those percentages over time. For example, has the state-of-mind percentage decline over time or even the dislike for the taste?

In Figure 10, both of these top primary reason percentages are plotted for each year averaged over the household reported in each year. By 2013, approximately 22% of the household indicated *"No one in my household likes the taste"* and between 2008 and 2013 that percentage slightly increased. Clearly, taste issues remain an important decision factor influencing household purchases of mangos. Similarly, there were only minor changes in the percentage for *"just didn't think of it"* with the percentage in 2013 being nearly 18%. What is apparent with Figures 9 and 10 is that both point to two important areas having a negative impact on the demand for mangos.

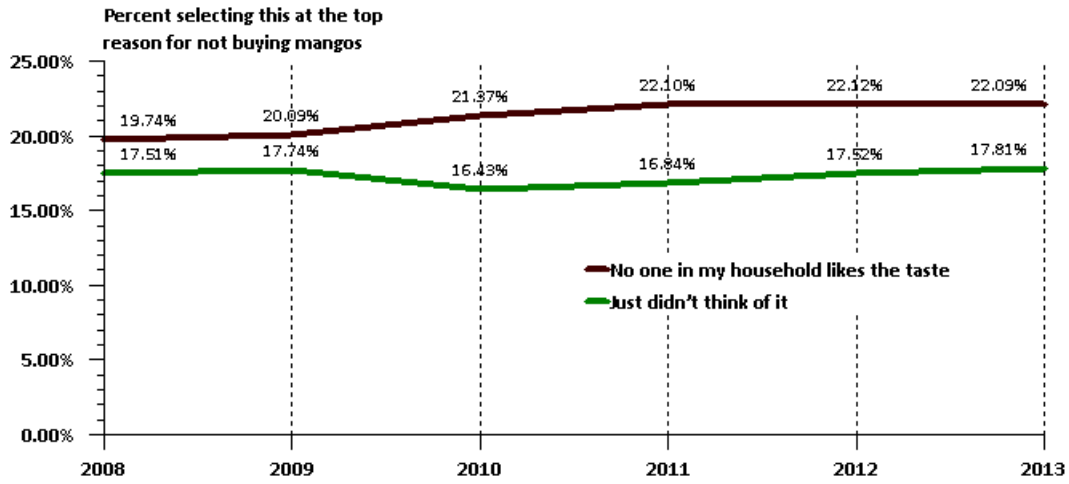

Figure 10. Top two primary reasons for not buying mangos.

Concluding Observations

The ability of the NMB to move the demand for mangos has been scientifically established, now with several years of seeing positive ROI. Through July 2013, the ROI stood at 10.8 and an upward trend in the performance index as seen. Most of those gains can be attributed to the Board's ability to attract households to buy mangos (i.e., increases market penetration). Over the full time span from March 2008 through July 2013, FOB equivalent revenues (not profits) are estimated to be $1.056 billion and 22.5% of that total can be attributed to enhancing the U.S. demand for mangos. FOB revenues were $238 million more than would have occurred without the NMB and the resulting ROI is based on those gains and the Board's total expenditures of $22 million.