Review of fundamental market forces

- Price
- Supply
- Demand

Factors:
- Acreage
- Plantings
- Survival rate
- Yield
- Fertilizer
- Innovation
- Speculators
- Stock
- Holding power
- Efficiency
- Culture
- Region
- Cost price
- Substitutes
- Information
- Knowhow
- Chemicals
- Weather
- Knowledge
- Holding costs
- Decay
- Holding power
- FX
- Size
- M&A
- Import tariffs
- Tax
- Regulations
- Local consumption
- Culture
- Export
- Traceability
- GDP growth
- Inflation
- Middle class
- Population growth
- Food trends
- Organic
- Speculators
- New applications
- Sustainability
- Healthcare
- Innovations
- Regulations
- Import tariffs
- Tax
- Regulations
- Local consumption
- Culture
- Export
- Traceability
- GDP growth
- Inflation
- Middle class
- Population growth
- Food trends
- Organic
- Speculators
- New applications
- Sustainability
- Healthcare
Demand remains resilient, with consumption in producing countries and emerging economies becoming increasingly important.

### Total demand:
- **c. 446 KMT**
- **Annual growth:**
  - c. 2.4% p.a.
  - c. 10 KMT p.a.

#### Producing countries (KMT) (39% total)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>152</td>
<td>156</td>
<td>160</td>
<td>164</td>
<td>168</td>
<td>173</td>
</tr>
<tr>
<td>Malaysia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>39</td>
</tr>
</tbody>
</table>

#### Consuming countries (KMT) (61% total)

<table>
<thead>
<tr>
<th>Region</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>244</td>
<td>249</td>
<td>255</td>
<td>261</td>
<td>267</td>
<td>273</td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Middle East</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Asia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>69</td>
</tr>
</tbody>
</table>

### Source:
Nedspice research
Vietnam production is at an all time high and is expected to increase further over the next years

**Commentary**

- Vietnam production more than doubled in the last decade and represents c. 40% of global production

- After a c. 20% drop in 2015, production is expected to increase to an all time high of c. 210 KMT this year
  - Production is concentrated along the Cambodian border
  - Dak Lak is currently the largest production region (23% of total), showing a CAGR of 21% since 2012
  - Other regions showing strong growth are Dong Nai and Dak Nong, with a 27% and 24% CAGR since 2015 respectively

- New plantings have been at c. 16% annually since 2011 on average, and were relatively high over the last 3 years (18-28%)

- Though the % new plantings are expected to be below death ratios of c. 12% this year, they were well above over the last years, implying substantial increase in production over the next years

- Production is export focused, as domestic consumption is c. 6 KMT

- Yield ratios are at c. 2.4 MT/ha

- Quality control and the use of agrochemicals remain an important topic in Vietnam

**Vietnam production by region**

**Vietnam production is at an all time high**

Source: Nedspice research
Cambodia production is becoming more significant and is important for Vietnam price dynamics

Cambodia has a long history in pepper, but production never really exceeded c. 3,000 MT until recently
- Historically, cultivation was concentrated in the Kampot province
- Production decreased dramatically during the civil war (’70-’79)
- The Kampot pepper has always been recognized as a high quality pepper in Europe, also due to the French cultural heritage, and was granted Geographic Indicator status in 2010

With the consistent increase in prices since 2005, farmers slowly regained confidence in the crop, increasing plantings since c. 2008

Cambodia is now the 6th largest production country (4%), and takes the 4th place in terms of exportable production

Most of the Cambodian production is for export purposes as the local consumption is only c. 1,000 MT
- Over 75% is estimated to be exported to Vietnam, c. 20% to Thailand and the remainder directly to consuming countries

The Tbong Khmum province currently produces the vast majority of Cambodian pepper (70%+)

Yield is relatively high at c. 4.5 – 7.2 MT/ha

Generally, Cambodian farmers do not hold any stock and sell 1-2 months after harvesting, which impacts price dynamics for Vietnam

Source: Nedspice research, IPC, Phnom Penh Post
Other than Vietnam and Cambodia, only Brazil has meaningfully increased production.

**Indonesia**

- **KMT**
  - 12% of global production
  - '12-'17 CAGR (1%)
  - '15-'17 CAGR (4%)

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net export</td>
<td>25</td>
<td>60</td>
<td>47</td>
<td>57</td>
<td>70</td>
<td>56</td>
<td>65</td>
</tr>
<tr>
<td>Net import</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

**India**

- **KMT**
  - 12% of global production
  - '12-'17 CAGR (5%)
  - '15-'17 CAGR (13%)

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net export</td>
<td>50</td>
<td>50</td>
<td>54</td>
<td>45</td>
<td>85</td>
<td>53</td>
<td>65</td>
</tr>
<tr>
<td>Net import</td>
<td>(4)</td>
<td>(6)</td>
<td>(3)</td>
<td>(13)</td>
<td>26</td>
<td>60</td>
<td>62</td>
</tr>
</tbody>
</table>

**Brazil**

- **KMT**
  - 12% of global production
  - '12-'17 CAGR (11%)
  - '15-'17 CAGR (12%)

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net export</td>
<td>36</td>
<td>38</td>
<td>39</td>
<td>39</td>
<td>51</td>
<td>52</td>
<td>64</td>
</tr>
<tr>
<td>Net import</td>
<td>30</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>44</td>
<td>45</td>
<td>57</td>
</tr>
</tbody>
</table>

**Sri Lanka**

- **KMT**
  - 3% of global production
  - '12-'17 CAGR (1%)
  - '15-'17 CAGR (8%)

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net export</td>
<td>17</td>
<td>18</td>
<td>23</td>
<td>20</td>
<td>20</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Net import</td>
<td>13</td>
<td>14</td>
<td>19</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

1) Net export (import) defined as production minus local demand, i.e. assumes no local stocks.

Source: Nedspice research.
Vietnam and Brazil have been driving growth in supply, with Cambodia becoming more important rapidly.

Global pepper production – L5Y (KMT)

- Vietnam and Brazil show strongest growth among leading production countries

Exportable production¹ – L5Y (KMT)

- Vietnam continues to dominate supply for export purposes
- Brazil strengthens growth in exports, while China and India remain less important
- Cambodia is rapidly increasing its position

1) Excludes imports and exports between producing countries.
Source: Nedspice research

NEDSPICE
Despite relatively strong and growing position of Indonesia in white pepper, Vietnam remains the determining factor.

Global pepper production by country – 2017F

- Vietnam: 40%
- Indonesia: 13%
- India: 12%
- Brazil: 12%
- China: 7%
- Cambodia: 4%
- Others: 12%

Total: 523 KMT

Black versus white pepper production – L5Y (KMT)

- Black pepper
  - Vietnam 43%
  - Indonesia 28%
  - Malaysia 28%
  - Others 14%

- White pepper
  - Vietnam 28%
  - Indonesia 27%
  - Malaysia 3%
  - Others 14%

Total: 432 KMT (83% of total)

Indonesia production by region

- Black pepper
  - Lampung 87%
  - Kalimantan 5%
  - Others 8%

- White pepper
  - Lampung 87%
  - Kalimantan 20%
  - Others 4%

Total: 40 KMT (62% of total)  Total: 25 KMT (38% of total)

CAGR '12-'17 '15-'17
- Black pepper
  - 5.5%  6.0%
- White pepper
  - 8.4%  8.8%

Source: Nedspice research
Supply is starting to exceed demand meaningfully, increasing stock levels especially in producing countries.

Global pepper production – 2017F

- Vietnam: 40%
- Indonesia: 13%
- Others: 12%
- Cambodia: 4%
- China: 7%
- Brazil: 12%
- India: 12%

Total: 523 KMT

Global consumption – 2017F

- Consuming countries: 61%
- Europe: 11%
- North America: 19%
- Middle East: 12%
- Africa: 9%
- Asia: 7%
- India: 6%
- China: 5%
- Indonesia: 3%
- Others: 2%

Total: 446 KMT

Global production vs consumption – L5Y (KMT)

- Production: 5.5% CAGR
- Consumption: 2.4% CAGR

Reasonable pipeline stock: 100

Global stock development – L5Y (KMT)

- Producing countries: 100 MT+ p.a.
- Consuming countries: 10 MT+ p.a.

Source: Nedspice research
It’s likely that supply will continue to exceed demand in the foreseeable future.

Historically, there is a c. 3-6 years reversal period.

Illustrative cost price of pepper over years (Vietnam)

Planting estimates suggest supply will continue to outgrow demand

Pepper still looks relatively attractive versus alternatives.

<table>
<thead>
<tr>
<th></th>
<th>Pepper</th>
<th>Coffee</th>
<th>Rubber</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US$, 1 ha</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment before first production</td>
<td>38,973</td>
<td>17,725</td>
<td>15,739</td>
</tr>
<tr>
<td>Year of first production</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Current price (US$/MT)</td>
<td>4,000</td>
<td>1,900</td>
<td>443</td>
</tr>
<tr>
<td>Break-even costs / MT (year 5)</td>
<td>4,230</td>
<td>5,004</td>
<td>n.a.</td>
</tr>
<tr>
<td>Marginal costs / MT (year 5)</td>
<td>911</td>
<td>1,487</td>
<td>939</td>
</tr>
<tr>
<td>Break-even costs / MT (year 10)</td>
<td>1,840</td>
<td>2,254</td>
<td>739</td>
</tr>
<tr>
<td>Money multiple (5 years, cum.)</td>
<td>0.9x</td>
<td>5.0x</td>
<td>0.6x</td>
</tr>
<tr>
<td>Money multiple (10 years, cum.)</td>
<td>2.2x</td>
<td>0.8x</td>
<td>0.6x</td>
</tr>
<tr>
<td>Marginal costs / MT (year 6)</td>
<td>911</td>
<td>1,487</td>
<td>939</td>
</tr>
<tr>
<td>Money multiple (year 6, marg.)</td>
<td>4.4x</td>
<td>1.3x</td>
<td>0.5x</td>
</tr>
</tbody>
</table>

1. 2017 price level based on May-17, i.e. there is a timing mismatch.
2. Weighted average of estimated increase in Vietnam, Cambodia and Brazil planted area.
3. Concerns Robusta coffee and 33% TSC rubber.

Source: Nedspice research, market data as per May-17.
What can we expect from the current market?
A purely technical approach

Black pepper peaks at US$10,908/MT in Jun-15, white pepper at US$15,000/MT in Jul-15

Black pepper low at US$1,565/MT in Jul-05

White pepper low was in Mar-02 at US$2,094. The rates shown here are versus the black pepper low in Jul-05.

Source: Nedspice research, monthly price data as per 1-May-17
History tells us that a further downward price movement is not unthinkable.

- Historically, the market dropped by an average of (78)% in a downward cycle versus the market top.
- This would imply a low of US$2,371/MT and US$3,334/MT for black and white pepper respectively.
- These levels would still be well above historical lows.

Note: Green dotted line represents black pepper cycle high and low price levels. The percentage increase in white pepper (shown in orange) reflects differences in white pepper high and low price levels, i.e. this can differ from the period indicated by the green dotted line.

Source: Nedspice research, monthly price data as per 1-May-17.
Pepper is no exception in showing strong price movements versus other commodities (1/2)

Source: www.investing.com, www.indexmundi.com, monthly price data as per Mar-17
Pepper is no exception in showing strong price movements versus other commodities (2/2)

Ginger

![Graph of Pepper price movements]

Nutmeg

![Graph of Nutmeg price movements]

Turmeric

![Graph of Turmeric price movements]

Garlic

![Graph of Garlic price movements]

Source: Nedspice research, monthly price data as per May-17

+328%  
+353% 
+409%  
+536%

(51)%  
(68)% 
(74)%  
(27)%
Fundamental analysis (1/4): Stock ratio measures global stock level relative to demand. Despite an increase in global stocks, the stock ratio is still at a relatively low level…

Global stock position versus demand

1) Defined as global stock position / global demand.
Source: Nedspice research
Fundamental analysis (2/4): Historically, cycles seem to bottom at stock ratio’s of between 100%-150%...

Note: 2017 price level based on May-17, i.e. there is a timing mismatch versus estimated year end stock.
1) Defined as global stock position / global demand.
Source: Nedspice research
Fundamental analysis (3/4): But last cycle bottom occurred at a lower stock ratio → Cycle bottoms tend to occur at lower stock ratio levels

Stock ratio versus price

Potential explanatory factors for price lows at lower stock ratio levels:
- Information technology
- Production / supply chain efficiency
- One-off effects: speculation, market sentiment, height / duration of previous market high, etc.

Current price ~US$ 4,100

Note: 2017 price level based on May-17, i.e. there is a timing mismatch versus estimated year end stock.
1) Defined as global stock position / global demand.
Source: Nedspice research
Fundamental analysis (4/4): Data suggests that stocks will have to increase significantly for prices to reach historical lows.

Note: 2017 price level based on May-17, i.e. there is a timing mismatch versus estimated year end stock.
1) Defined as global stock position / global demand.
2) Based on estimated excess production in 2017. Note that no adjustment is made for expected increase in demand.

Source: Nedspice research

<table>
<thead>
<tr>
<th>Assumed stock ratio</th>
<th>60%</th>
<th>75%</th>
<th>100%</th>
<th>125%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implied stock level</td>
<td>268</td>
<td>335</td>
<td>446</td>
<td>558</td>
</tr>
<tr>
<td>2017F stock level</td>
<td>257</td>
<td>257</td>
<td>257</td>
<td>257</td>
</tr>
<tr>
<td>Required increase (Delta vs 2017F level)</td>
<td>11</td>
<td>77</td>
<td>189</td>
<td>301</td>
</tr>
<tr>
<td>Years excess production (@ 77k MT p.a.)</td>
<td>0.1</td>
<td>1.0</td>
<td>2.5</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Concluding summary

— Growth in demand remains resilient at c. 2.5% p.a. (10 MT+), with consumption in producing countries and emerging economies becoming increasingly important.

— Prices at farm level, although lower, are still attractive. Excess production is expected over the coming years, which will cause global stocks to increase.

— Technical Analysis: The current decrease in price has been strong, however it is not extreme when compared to historical pepper bear markets and other commodities.

— Fundamental Analysis: To reach historical lows of previous cycles global stocks need to increase by some 200,000 tons, which at current production levels can be reached in 2.5 - 3.0 years.

1) Assumes no adverse climatic and / or economic events.

Source: Nedspice research
Thank you for your attention

Presentation can be downloaded from http://www.nedspice.com/company_downloads