Medicinal Cannabis: Capital, Value, Quality Assurance and the (small) Grower

Medicinal Marijuana Forum
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Questions

1. What are the likely key requirements for successful participation in the delivery of valued medicinal cannabis products to the end-user?

2. Is there a place for the small grower in the emerging medicinal cannabis industry?

   Alternatively, is it financially feasible to reserve a space for the small grower in the medicinal cannabis segment, given likely industry behaviour, standards and funding requirements?

- Qualification to speak
- Distinction: medicinal and non-medicinal
In April 2015, Bloomberg Intelligence identified 55 public companies in the cannabis space with a combined market cap of $3 billion. The publication’s 2015 Weed Index groups the companies into seven categories...

Companies in the pharmaceutical/research sector were reported as having a market cap of $1.5 billion. Producers, including medical cannabis growers, cultivators and distributors, came in second place at $645 million.

Industry perspectives

Oxford University will be at the forefront of a multimillion-pound research program, which hopes to help develop new therapies for acute and chronic conditions by examining the effects of medical cannabis. The oldest university in England will be teaming up with private equity company, Kingsley Capital Partners who will provide up to £10 million ($12.36 million) in initial investment, which will be funded through its new biopharmaceutical firm Oxford Cannabinoid Technologies (OCT).

https://www.cnbc.com/2017/03/16/oxford-university-to-launch-medical-cannabis-research-programme.html
More than 500 Israeli companies have applied for licenses to grow, manufacture and export cannabis products, according to government officials, and some are already capitalizing on the booming U.S. market. ... In the past year, U.S. and other firms have invested about $100 million to license Israeli medical marijuana patents, cannabis agro-tech startups and firms developing delivery devices such as inhalers ...

http://www.reuters.com/article/us-israel-cannabis-idUSKBN16U1PZ

In addition to financing the research in biochemistry and medicine, (Israel’s) Agriculture Ministry funds will go to six projects aiming to improve the growth of cannabis plants. These projects involve developing technologies for optimal irrigation and fertilization, combating diseases and pests specific to cannabis and honing methods for planting and reproducing cannabis.

Value Creation Elements

Cultivation
- Infrastructure
- Crop & fertility practices
- Varieties

Prod Devlpmnt
- Research
- New varieties
- Exp. trials
- Funding
- Processing
- Distribution
- Marketing (?)

Security
- Policy
- Regulator

Quality Assurance
- Harvest
- Transport
- Storage

End-User
- Requirements
- Advisor (Dr.)

Access Point

Requirements
Advisor (Dr.)
Value creation

1. Begin with end-user requirements & work backwards
   a. Choice: Product & treatment options available
   b. Specialist advisor (doctor?) & prescription
   c. Research and new products in pipeline

2. Safety: Standardisation & quality assurance
   a. Problem types
      i. Variable concentrations of desired agent
      ii. Unwanted agents: Are they really inert (e.g., junk DNA)?
   b. Pharmaceuticals comparison
   c. Agricultural chemicals
## Cultivation Costs

### Table 1

**Cultivation Costs by Method**  
US$/lb, Dried Flower [annualised]

<table>
<thead>
<tr>
<th></th>
<th>Field</th>
<th>Greenhouse</th>
<th>Indoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment, land &amp; infrastructure</td>
<td>1</td>
<td>10</td>
<td>43</td>
</tr>
<tr>
<td>Security design &amp; infrastructure</td>
<td>14</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Cultivation -Labour</td>
<td>249</td>
<td>253</td>
<td>252</td>
</tr>
<tr>
<td>Cultivation -Non-labour inputs</td>
<td>22</td>
<td>247</td>
<td>348</td>
</tr>
<tr>
<td>Compliance costs</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Fees &amp; charges</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>320</td>
<td>554</td>
<td>688</td>
</tr>
</tbody>
</table>

*Source: Table 4.2, DT Report*
# Cost Shares: Cultivation

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Field</th>
<th>Greenhouse</th>
<th>Indoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment, land &amp; infrastructure</td>
<td>0.2</td>
<td>1.9</td>
<td>6.3</td>
</tr>
<tr>
<td>Security design &amp; infrastructure</td>
<td>4.3</td>
<td>1.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Cultivation -Labour</td>
<td>77.8</td>
<td>45.6</td>
<td>36.7</td>
</tr>
<tr>
<td>Cultivation -Non-labour inputs</td>
<td>6.9</td>
<td>44.5</td>
<td>50.7</td>
</tr>
<tr>
<td>Compliance costs</td>
<td>0.7</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Fees &amp; charges</td>
<td>10.1</td>
<td>5.8</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Cost Shares: Cultivation

**Fig 1a: Labr + Inputs ± 85%**

- Field
  - Labr: 78%
  - Inputs: 7%
  - Fees: 10%
  - Compl: 1%
  - Secr: 4%
  - Land: 0%

**Fig 1b: Labr + Inputs ± 90%**

- Grn-Hse
  - Labr: 46%
  - Inputs: 44%
  - Fees: 6%
  - Compl: 0%
  - Land: 2%
  - Secr: 2%
Cultivation Issues

1. Security (perimeter fencing?)
2. Infrastructure (irrigation)

3. Sourcing appropriate varieties
4. Practices appropriate for variety, use & quality standards

5. Crop management & chemical residues
   a. Biochemical interactions in user
   b. Pest & disease; weeds; fertility
   c. Systemic & surface treatments
   d. Organic vs non-organic (coconut oil case)
   e. Natural: Variable meaning

6. Traceability: Record keeping & monitoring

7. Competences required: How sourced?
## Cannabis Oil Production Costs

### Table 3

<table>
<thead>
<tr>
<th>Extraction Method</th>
<th>Total Mfg</th>
<th>Extraction Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier (olive) oil extraction</td>
<td>14.3</td>
<td>7.2</td>
</tr>
<tr>
<td>Solvent extraction</td>
<td>16.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Sub-critical CO2 extraction</td>
<td>15.6</td>
<td>9.3</td>
</tr>
<tr>
<td>Light hydrocarbon extraction</td>
<td>9.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Source: Tables IV and 4.4, DT Report
Cannabis Oil Production Costs

**Fig. 2: Total Oil Mfg Cost**
(US$/lb dried flower)

- Olive: 14.3
- Solvt: 16.5
- CO2: 15.6
- HydCrb: 9.1

**Fig. 3: Oil Extraction Costs**
US$/lb Dried flower

- Olive: 7.2
- Solvt: 9.5
- CO2: 9.3
- HydCrb: 3.1
Processing & Distribution Issues

1. Sourcing plant inputs & quality standards
   a. Consistency: supply & potency

2. Sourcing options
   a. Integration: Internal control; costly
   b. Contracting: Relational; monitoring problem
   c. “Open” market(?): Transactional; price & quality risk

3. Distribution & marketing
   a. Security (regulations)
   b. Product advantage: How known by target or advisor?
   c. Competition & marketing (Prohibitions? Regulations?)
Processor & Product Development

1. New “legal” industry; research frenzy

2. Necessity due to rivalry for advantage

3. Treatments: Agents; action mechanisms; delivery medium

4. Competences: Availability? Adequate quantity & price/wage?

5. Facilities & experimental trials?

6. Funding: Very costly activity with high payoff uncertainty
Global Industry Profile

1. Emergent competitive industry
2. Numerous small entrants likely (small capitalisation)
3. Novel products; research driven
4. Highly specialised competences at product processing and development stages
5. Consolidation very likely; many (most?) entrants will fail
6. Entry of “big capital” likely with stable regulatory regime
7. Leading research territories: Canada, Australia, Netherlands, Israel
Capital: Investment & Funding Issues

1. Emergence of industry analysts and investment advisors: Why?

2. Capital: opportunities, risk & return

3. Processor:
   a. Treatments: New product development & research
   b. Funding requirements

4. Funding product research:
   a. Who does it?
   b. Public & private
Quality Assurance

1. Internal standards, controls & monitoring

2. Industry standards & self-regulation/enforcement: Difficult in emergent industry with participants fighting for advantage

3. Public regulator

4. Funding cost of quality assurance mechanism(s)
Our Questions

Is there a place for the small grower in the emerging medicinal cannabis industry?

1. Small grower traits: CASE or agri-science graduate?
2. Competence requirements: chemicals & crop management
3. Funding requirements: secure perimeter and infrastructure
4. Standards & consistency
5. Records & monitoring requirements

Options

1. Contract grower: admin costs & consistency problem for processor
2. Aggregator as intermediary
3. Cooperative: dispersal & coordination; variable land & cultivation practices; quality assessment of variable sources (e.g., sugar, sucrose content & compensation)
Our Questions

What are the likely key requirements for successful participation in the delivery of valued medicinal cannabis products to the end-user?

- Product innovation; novel treatment protocols
- Diversity: product portfolio to manage risk
- Research infrastructure & large funding requirement
- Competence access and price
- Secure funding (5 year minimum?)
Policy

1. What are other jurisdictions doing?
   a. Funding and encouraging research in plant varieties, cultivation practices, and medical treatments
   b. Regulations

2. What can/should local policy do?
   a. Does brand advantage exist for medicinal cannabis (seems unlikely if efficacy & price are more important)?
   b. Tax policy
   c. Land access
   d. Funds from (via partnership?) China (given US Federal regulations limit grants and loans from connected development institutions)?
Final remarks

- Industry attracting substantial investment: Why?