Linux on laptops

The truth about market dynamics

February 2012
The year of desktop Linux

Didn't happen because

- It looks ugly ( )
- It's hard to use ( )
- Lacks applications ( )
- Lacks compatibility ( )
- All of the above ( )
The year of desktop Linux

Didn't happen because
- It looks ugly ( )
- It's hard too use ( )
- Lacks applications ( )
- Lacks compatibility ( )
- All of the above ( )

NONE of the above (X )
A basic retailless market

I'd take product X
If you had it

Give me a week
or two...

Consumer

Producer
What is retail?

Definition

A retail channel is a commercial connection between producers and consumers.

Is it efficient?

Definition

A retail channel is said to be efficient if it enables complete feedback between producers and consumers.
The retail channel

I'd take product X if you had it
Examples of non-efficient retail channels

Digital content

People want to download. The market still wants to rent and sell DVDs. Where are the legal download or streaming options?

People want PDF based newspapers to read with their preferred application; to organize and index. The market wants to sell online viewers and single OS applications for viewing DRM encumbered files.
Examples of non-efficient retail channels

Computers

Businesses want computers that don't break that often... even if more expensive. Market sells cheaper and cheaper units, sometimes packed with useless features and constant changes that add no value. **Failures per year is not part of the spec.**
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Our main example

Laptop operating systems

Some people want laptops with pre-installed Linux. No retailer has such an option available.

Fact

Locally supported pre-installed Linux sold 10% at the first market trial in Portugal. This happened via a Government program where the 40K sold Linux units had better hardware for the same price.
Oligopolies

Definition

An oligopoly is a market dominated by a small number of players.
Main findings of this work

1. A retail channel oligopoly is inefficient.
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Proof
Main findings of this work

2. A retail oligopoly is conservative; tends to filter new products
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Main findings of this work

3. This kind of inefficiency costs money

Lowers the GDP
Kills jobs
Market configuration

Suppliers → Large retailers → Consumers

- International brands
- Locally assembled solutions blocked by retailers
- Consumers have no access to competing products
Market failure

Fact
The local hardware assembler that sold 40k units in the previously mentioned Government project is unable to place pre-installed Linux on any of the retail chains.

Usual excuse
Consumers aren't interested.
Market pathology

Symptoms
No correlation between demand and supply.
Consumers can't evaluate the product. Demand can't take off. Supply is artificially set to zero.
Retailers decide as if they knew what consumers want.
Market pathology

Explanation

Every new product that doesn't come from a known brand has an initial small probability of acceptance.

When exposed to a large number of consumers that probability will in time match the product performance.

Reference: Tipping Point, by Malcom Gladwell
Market pathology

Explanation
But the number of consumers it gets exposed to is decided by the retail chains...
**Market pathology**

**Explanation**

Given enough retail chains even an initially small acceptance probability will enable product placement.

However, for retail oligopolies reasonable acceptance probabilities (eg 10%) are translated to zero.

This is due to cross-retailer interaction and the “anomalies” of small numbers...
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Market pathology

Explanation
Microscopically we'd think of bias, bribing, stupidity, evilness, etc

Macroscopically this is just statistics.

Eg: conservativeness is a property of small numbers.
A model for producer-retailer interaction

Given N retailers:

- Each agreement attempt is a Bernouly trial
- The probability of success is $p = p_0 (1-c)$ before any success
- The probability of success is $p' = p_0 + (1-p_0)c$ after one or more successes
- $p'$ is larger than $p$
- $c$ controls the intensity of cross retailer interaction (joint action)
- If during the sequence trial $j$ is successful the initial $j-1$ retailers will be retried, after the remaining $N-j$
A model for producer-retailer interaction

- Negotiation barrier for new products
A model for producer-retailer interaction

We either have \( N \) failed trials or \( N + j-1 \) trials with \( k \) successes.

Whenever there is a success the process is decomposed as:
- a sequence of \( j-1 \) failures + 1 success – with parameter \( p \)
- a sequence of \( N-1 \) bernouly trials of parameter \( p' \)
A model for producer-retailer interaction

Let $X_s$ measure the overall number of successes

$X'_s$ measure the number of successes given a first one existed
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A model for producer-retailer interaction

\[ P(X_s = k) = \frac{P(X'_{s = k - 1} \cap X_s \neq 0)}{P(X_s \neq 0)} \]

\[ P(X_s = k) = \frac{P(X'_{s = k - 1}|X_s \neq 0) \cdot P(X_s \neq 0)}{P(X_s \neq 0)} \]

\[ P(X_s \neq 0) = 1 - P(X_s = 0) = 1 - (1 - p)^N \]

or

\[ P(X_s \neq 0) = \sum_{j=0}^{N-1} p(1-p)^j = 1 - (1 - p)^N \]

\[ P(X'_{s = k - 1}|X_s \neq 0) = p^{(k-1)}(1 - p')^{(N-k)} \binom{N-1}{k-1} \]
A model for producer-retailer interaction

\[ P(X_s=k) = \frac{(1-p)^N}{1-(1-p)^N} \binom{N-1}{k-1} p^{k-1} (1-p')^{N-k} \]

\[ k=0 \quad 0 < k \leq N \]

\[ <X_s> = [1-(1-p)^N] [1+(N-1)p'] \]
Expected share of retailers

$p_0 = 0.1$
Effective expected share of retailers

$p_0 = 0.1$
The narrow window of product placement for N=4

$p_0=0.1$
Direct costs

<table>
<thead>
<tr>
<th>Business indicators</th>
<th>Year 1</th>
<th>Cruise year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discretionary income impact</td>
<td>2.321,0</td>
<td>3.481,5</td>
</tr>
<tr>
<td>Trade deficit impact - import decrease</td>
<td>2.424,4</td>
<td>3.636,6</td>
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<tr>
<td>GDP impact</td>
<td>3.445,0</td>
<td>5.167,5</td>
</tr>
<tr>
<td>Direct employment impact</td>
<td>52</td>
<td>75</td>
</tr>
</tbody>
</table>

Values in thousands of € except for employment, measured in units

Table 3: Estimated market share in the laptop market by class

Table 5: Impact of product in the market
Indirect costs

Cross market interaction
There are huge indirect costs that result from this situation.

IT decisions maker are individual consumers as well. Being unaware of alternative operating systems they won’t be able consider them for organizations.

The cost of enterprise licenses is much higher...
Conclusions

- The retailers' blockade is harmful to local economy
- Innovation and consumer choice are not granted
- Indirect costs may surpass direct costs
- Joint action is real and doesn't need to be explicit
- An oligopoly of retailers is not significantly different from a monopoly
- The market won't fix itself on its own