How to incentivize people?

—reward mechanisms in multi-level marketing

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1. Time Critical Social Mobilization. Pickard et al. Science 2011

1. Mechanisms for Multi Level Marketing. Emek et al. EC 2011.

1. Ethical Issues Connected with Multi-Level Marketing Schemes. Koehn. Journal of Business Ethics 2001.

Paper 1: Time Critical Social Mobilization

Task

- It is a Network Challenge launched by DARPA

- **Goal:**
  Required teams to provide coordinates of ten red weather balloons placed at different locations in the continental United States.

- **Key point:**
  1) spread information about the tasks widely and quickly
  2) effectively incentivize individuals to act

What we used to do?

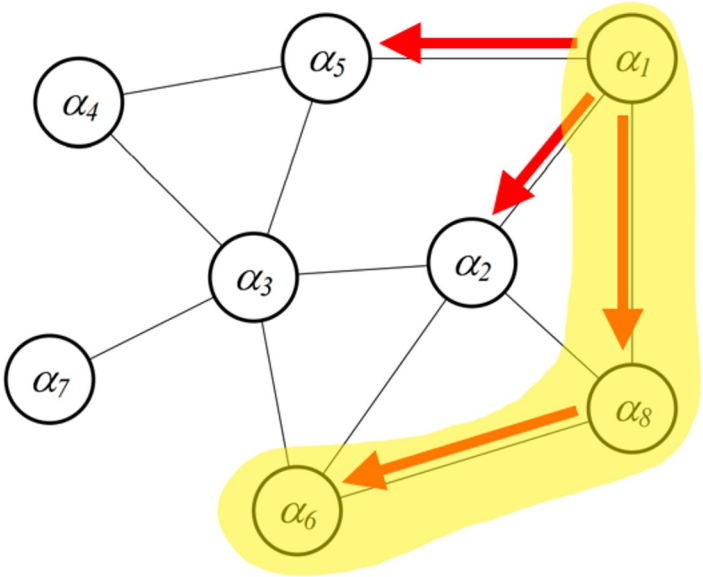
POSTERS

LOUDSPEAKER

MASS MEDIA

What we can do?

—The Recursive Incentive Mechanism

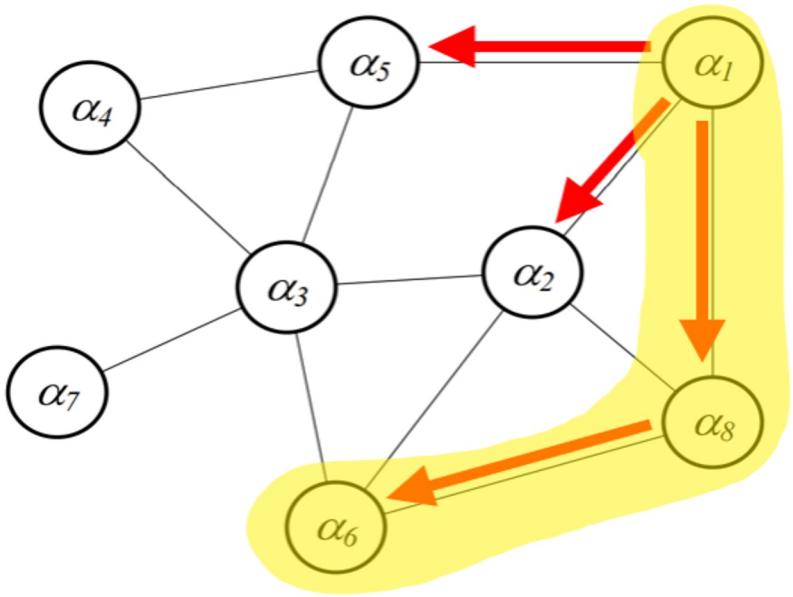


Example social network.

Spread Chain:

- α1 is the origin
- agent α1 recruits α2, α5 and α8
- α8 recruits α6
- α6 finds balloon

The Recursive Incentive Mechanism



Everyone on this chain will get a reward:

Budget for each task

$$\frac{v(\psi_i)}{2(|\mathcal{S}(\psi_i)|-k+1)}$$

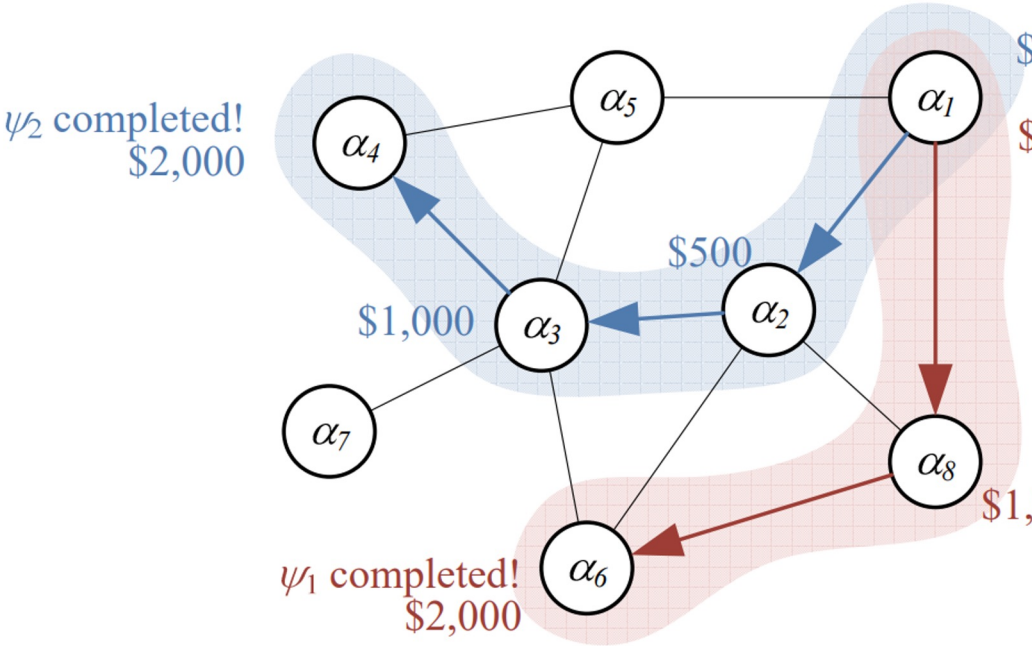
Length of chain

Position on chain

Also, there is a surplus:

$$S = B - \sum_{\alpha_j \in N} \rho_j$$

Let's avoid math – An example



- v(ψi) = 4000
- Budget for finding a balloon is 4000
- Split 4000 to all people on the success chain

$$\{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots\dots, \frac{1}{2^k}\}$$

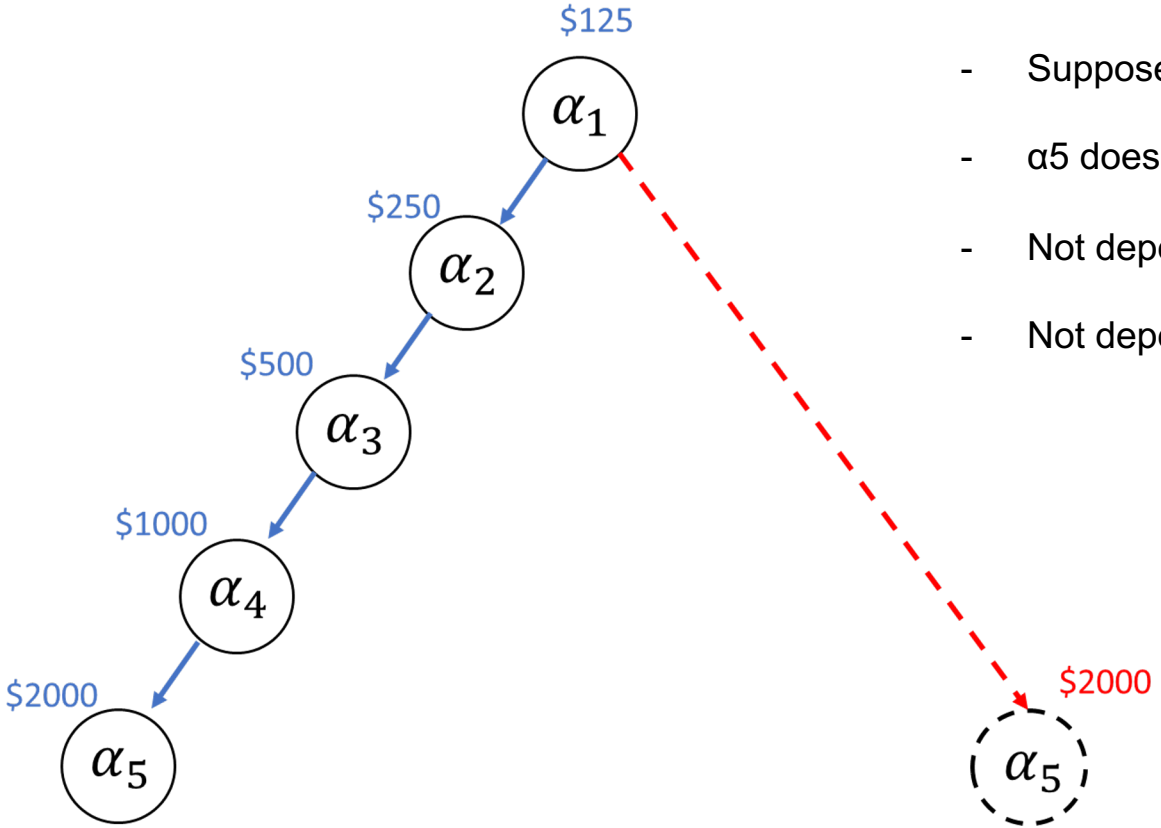
- surplus = $\frac{1}{2^k}$

Analysis

- “Recursive incentive mechanism is never in deficit”

$$sum\{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots\dots, \frac{1}{2^k}\} < 1$$

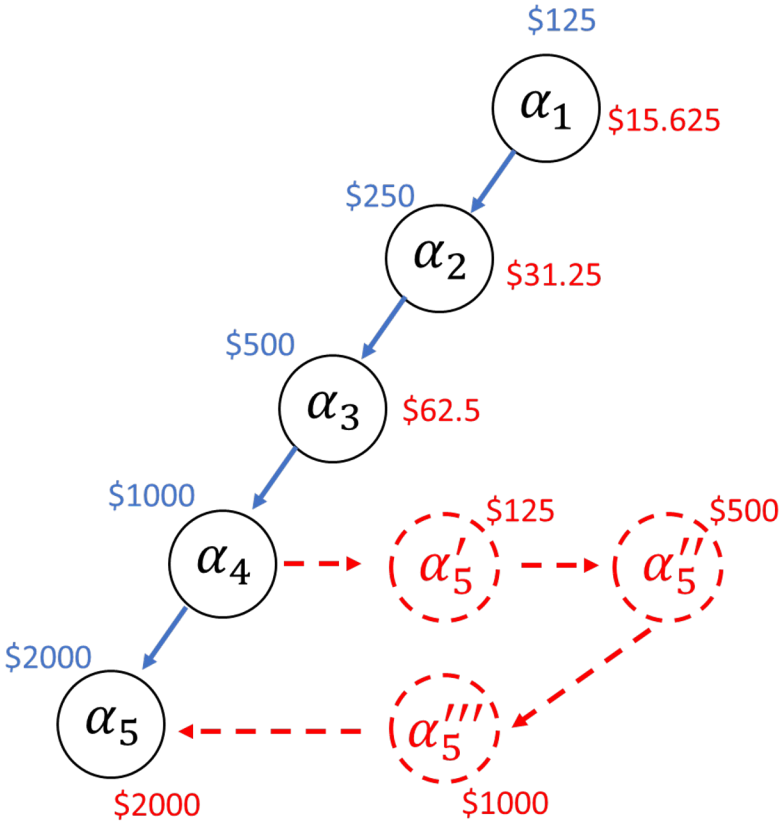
- “Resistant to certain kinds of manipulation”



- Suppose that α5 find the balloon
- α5 doesn't care where he is on the chain
- Not depend on position
- Not depend on length of chain

Discussion 1

– Fake Name Attack



- Originally, α5 will get $2000
- With fake name attack, α5 will get $3625, or even more

Discuss for 3min:

What if someone creates lots of accounts and thus takes lots of nodes in the chain to get more money? Can you come up with some ideas against this?

Why the Model Works

We want to make assumptions about limits and show that the model is optimal under both assumptions.

1）New members have no effect on existing members (about finding the target)

Why people recruits more nodes?

- Recruiting more nodes does not affect the probability of finding target yourself
- Recruiting more nodes increases the expectation of rewards

2）Each member's probability decreases from $\frac{1}{n}$ **to** $\frac{1}{n+1}$

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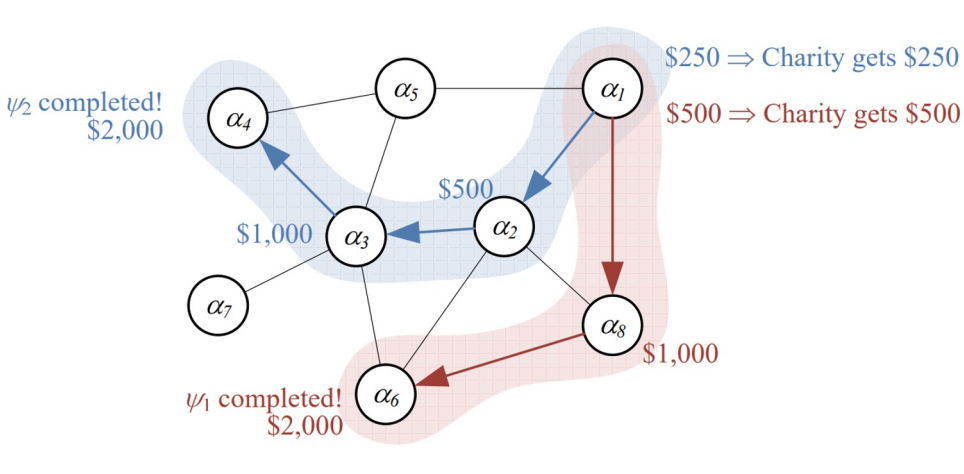
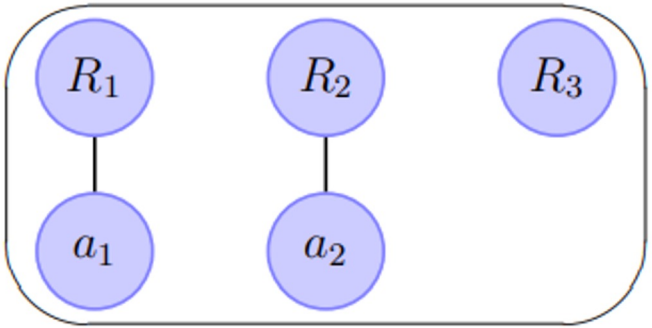


Discussion 2: Why the Model Works under this assumption?

Hint:
You can answer anything that comes to mind. However, the article uses **Nash equilibrium** to prove.

— "strategy profile in which all individuals recruit all their friends is a Nash equilibrium"

A simple scenario



- R3 always choose not to recruit
- two players, R1 and R2
- each of which has the option to recruit a single child or not
- equivalent to the “prisoner’s dilemma.”

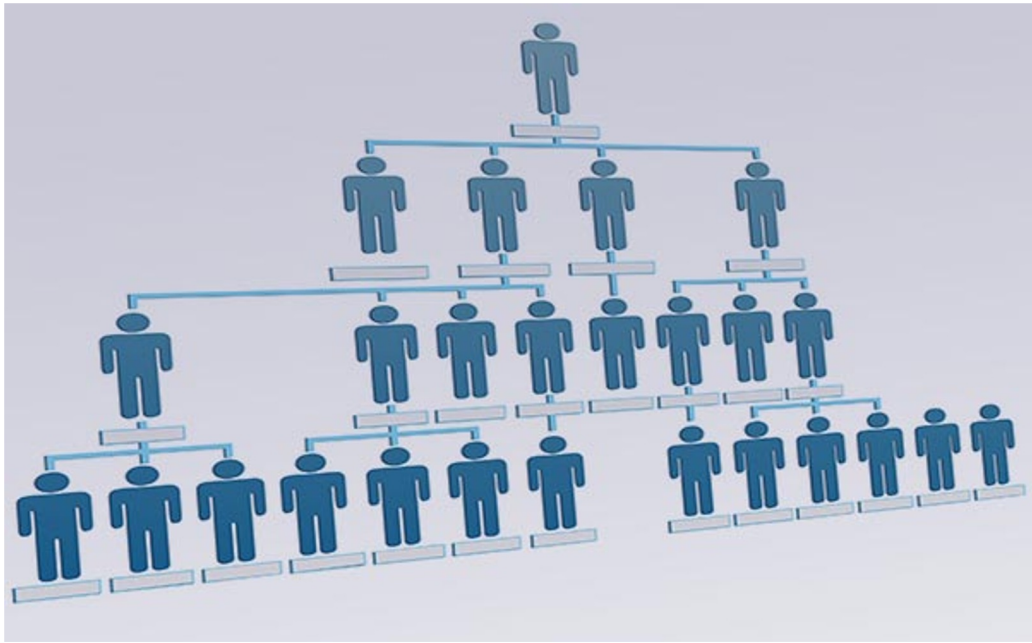
- neither of them recruits
  Both receive ⅓
- one recruits but the other does not
  Recruiter: $\frac{1+\frac{1}{2}}{4} = \frac{3}{8}$

  Other: ¼
- both recruit
  Both receive $\frac{1+\frac{1}{2}}{5} = \frac{3}{10}$

	N	Y
N	.33, .33	.25, .37
Y	.37, .25	.3, .3

Discussion 3

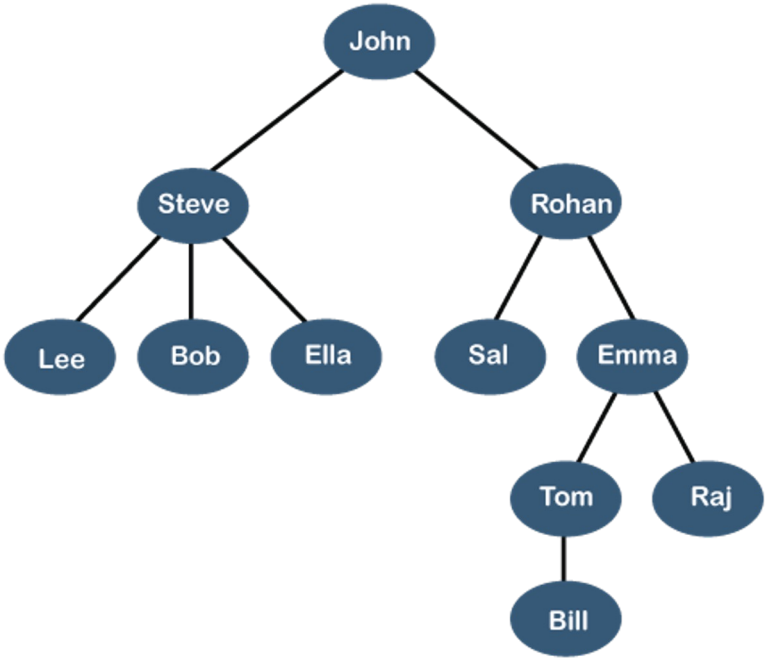
Can you come up with one or more scenarios that the method used in the paper can be applied to?



Paper 2: Mechanisms for Multi Level Marketing

— Multi-level marketing is a marketing approach that motivates its participants to promote a certain product among their friends.

The referrals tree model



- looking only at the structure of successful referrals
- mark only a single referrer for introducing the product

THE GEOMETRIC MECHANISM

– a reward mechanism

$$\mathrm{R}(T) \;=\; \sum_{u \in T} a^{\mathrm{dep}(u)} \cdot b \;.$$

- a & b: two constants that satisfied 0 < a < 1, b > 0
- The referrals tree

Properties

- Additivity (**ADD**) :
  T1 and T2 merged by root, then R(T1 U T2) = R(T1) + R(T2)

- Child Dependence (**CD**) :
  The reward of the root is uniquely determined by the rewards of its children

- Depth Level Dependence (**DLD**):
  This property essentially means that the credit for a referral depends solely on how direct (or better said, indirect) this referral is.

- Summing Contributions (**SC**):
  SC implies that each node in the tree T contributes some independent amount to the root, and that amount depends only on its depth.

DLD and ADD <==> SC

a reward mechanism satisfied SC and CD <==> it is a geometric mechanism

Sybil Attack

“An attacker subverts the service's reputation system by creating a large number of pseudonymous identities and uses them to gain a disproportionately large influence.”

Without Sybil Attack

$$\textbf{Profit} = \mathrm{R}(T_v) - \pi$$

Total amount of rewards earned

The money you pay for the product

With Sybil Attack (Creating “replicas”)

$$\textbf{New Profit} = \sum_{i=1}^{m} \sum_{\text{replica } u \text{ of } v \text{ in } \widetilde{T}^i} \mathrm{R}(\widetilde{T}_u^i) - \pi \times \#\text{replicas}$$

Total amount of rewards earned

The money you pay for all the products

Based on this formula, how to prevent Sybil Attacks?

About ethical issues on Multi-Level Marketing (MLM)

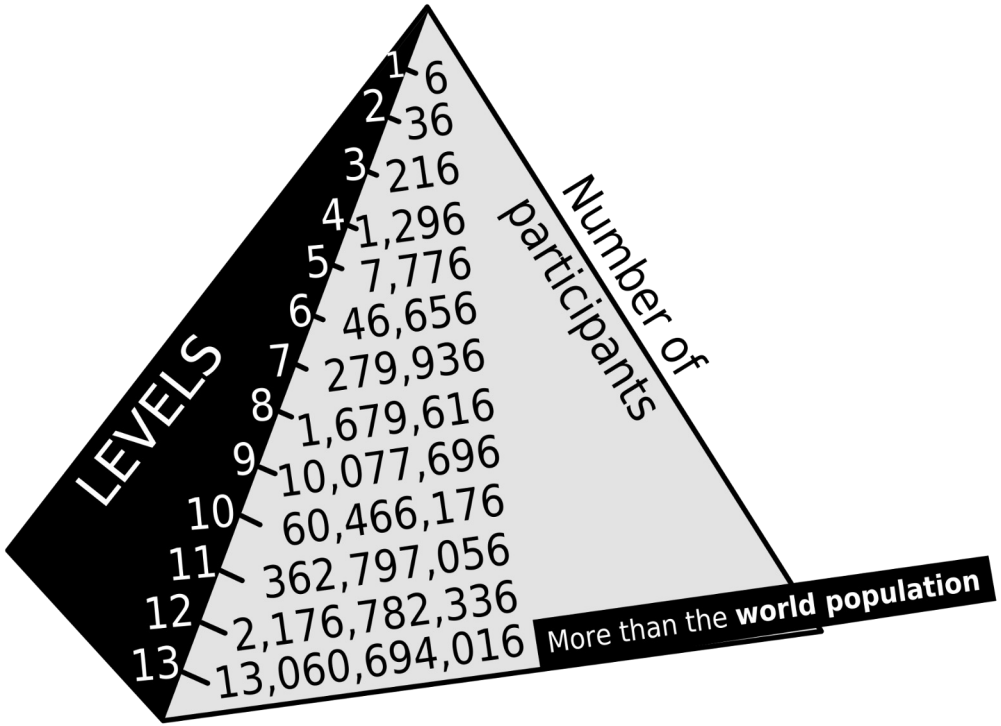
1. **It can be legal**

- Refer a friend to get rewards/cashback

1. **It can also be illegal!**

- Pyramid scheme / Endless-chain scheme

Pyramid Scheme



Why Pyramid scheme is illegal?

1. **It is fraudulent**

- Small investment -> Large return
- Get something for nothing

1. **It is recruitment-centered rather than product-centered**

David Rhodes electronic chain letter

1. You, as the first participant, see a list of 10 people on a bulletin boards;
2. You send money to the person at the top of the list;
3. Then you remove the top person name and put your name at the button of the list;
4. Forward this list to 10 bulletin boards.
5. You may receive money once you reach position 5

Question:

How many people would need to be involved before a participant would receive any money?

David Rhodes electronic chain letter

Copies in generation	Participant's position
10	–
100	10
1 000	9
10 000	8
100 000	7
1 000 000	6
10 000 000	5

Discussion 4

How to identify legal and ethical MLMs? Based on your previous knowledge and even experience.

How to identify legal and ethical MLMs?

In general:

1. **Really sell something**

   Monitor performance of independent agents to ensure that they really are making retail sales.

1. **Buy-back/Quit guarantee**

   Have buy-back policies in place so that independent contractors do not get stuck with excess product.

1. **Low entry fee**

   Charge low upfront-fees for the right to market the MLM product.

1. **Voluntary to buy sales training materials**

   Make purchases of sales training materials completely voluntary.

1. **Really sell something**

“Monitor performance of independent agents to ensure that they really are making retail sales.”

- Sell things to end-consumers, not “sell to sales” or Self-consumption
- In illegal MLM, the uplines in the company may pressure

  downlines to buy more goods in order to reach a higher level

2. Buy-back/Quit guarantee

“Have buy-back policies in place so that independent contractors do not get stuck with excess product.”

- If distributors must persuade their uplines to buyback the inventory, or if the upline is allowed to set the return price, distributors remain at risk.
- (1) publish clear guidelines for return
- (2) not play games designed to discourage inventory return

3&4 Upfront fees & sales materials

> “Charge low upfront-fees for the right to market the MLM product and make purchases of sales training materials completely voluntary”

- A company should not make most of money from upfronts fee or selling training materials to new recruits
- The criteria should be carefully set

Bad effects of illegal MLMs

1. Can hurt family members and friends.

   “Instrumentalize” relations

1. Can exploit the host-guest relationship

   Hosts want to “feed” the guests’ need

1. Can exploit the professional-client relationship

Discussion 5

The paper states that “many of those drawn into MLM schemes are desperate for a job”. So for students who are currently seeking a job, what are signals that a job might be an illegal MLM one?