

The 3rd International Conference
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METAMORPHOSIS

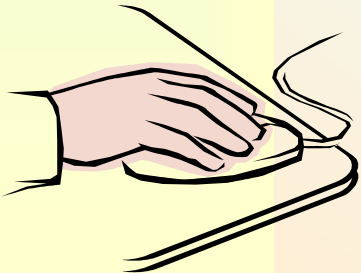
FROM “BRICKANDMORTAR” TO

“CLICKANDMORTAR”

BUSINESS MODEL

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Competitiveness

Perspectives of competitiveness:

- Sales
- Marketing
- Logistics
- Quality assurance
- After-sale services
- Refund and replacement warranties

Goal of competition

- Highest level of customer satisfaction and convenience
- Lowest level of cost
- Sustaining and enhancing profits in the future



Customer Service

- **Key element of competitive strategy**
- **Measuring customer service:**
 - **Delivery speed.**
 - **Cost.**
 - **Quality.**
 - **Customization.**
 - **Personal attention.**
 - **Product variety.**



Customer Service

- In the retailing environment:
 - Delivery speed, pricing and product variety
-  **customer satisfaction**
- An innovative distribution channel:
 - INTERNET & WORLD WIDE WEB (WWW)
- New buzzwords:
 - *Clickandmortar* as opposed to *brickandmortar*
 - *e-biz, e-trade, e-commerce, e-tail, dot-com, dot-biz*



Logistics System

- **Logistics System of a retailing company:**
 - Acquisition of the goods,
 - Storage of goods,
 - Transfer of goods from warehouses to stores
 - Delivery of goods to the end customers [in some cases]

in short ***Distribution Channels***



Clicks and Bricks

Brickandmortar

versus

Clickandmortar

No Web site, only *store site*.

Web site as an additional attractive show window of the *store site*.

No online transactions or orders, at most catalog sales or orders over the telephone.

Online transactions and orders.

Chiefly walk-in customers or customers who prefer catalog sales.

Both walk-in and online customers.

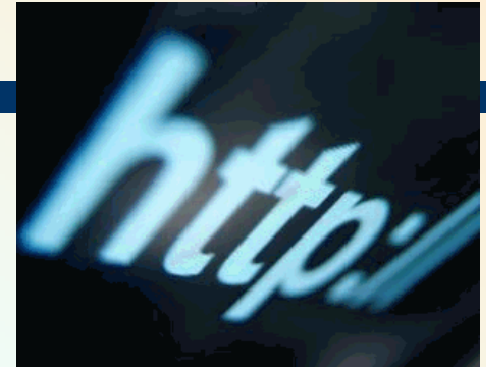
Goods rarely to be delivered.

Online orders to be delivered strictly within a *time window*.





From bricks to clicks...



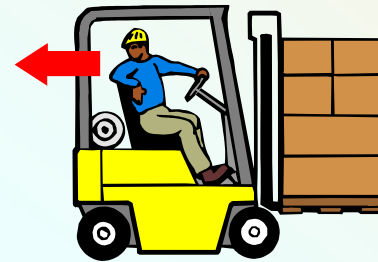
When a company goes online...

- **New warehouses.**
- **New delivery channels.**
 - ❖ Lease vehicles.
 - ❖ Buy vehicles.
 - ❖ Outsource the deliveries of goods through a third-party company.
- **Conversion of brickandmortar (BM) stores into clickandmortar (CM) stores with both physical and virtual storefronts.**

From clicks to bricks

When a pure Internet store wants to establish one foot in the old world.

- New warehouses
- Clickandmortar stores to serve walk-in customers too, who still prefer personal interaction and physical presence during shopping.





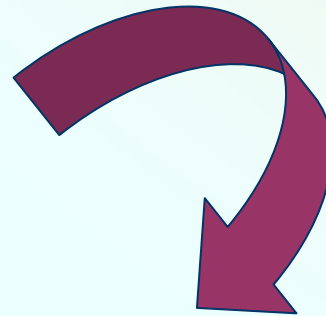
Clicks supported by Bricks

The April 17th 2000 issue of the Wall Street Journal quotes David Court, a director at **McKinsey & Co.** management consulting firm:

1. *“Companies who can put together a winning multichannel value propositions are going to get a higher share of wallet than a pure online business.”*
2. *“People who are ‘multichannel shoppers,’ buying both online and offline, spend significantly more than people who just buy online.”*



Transition from bricks to clicks



OUR FOCUS

Development of a strategy to...

- i. support this business model change, and...
- ii. cope with the logistics problems faced by such brickandmortar retailers



Transition from bricks to clicks

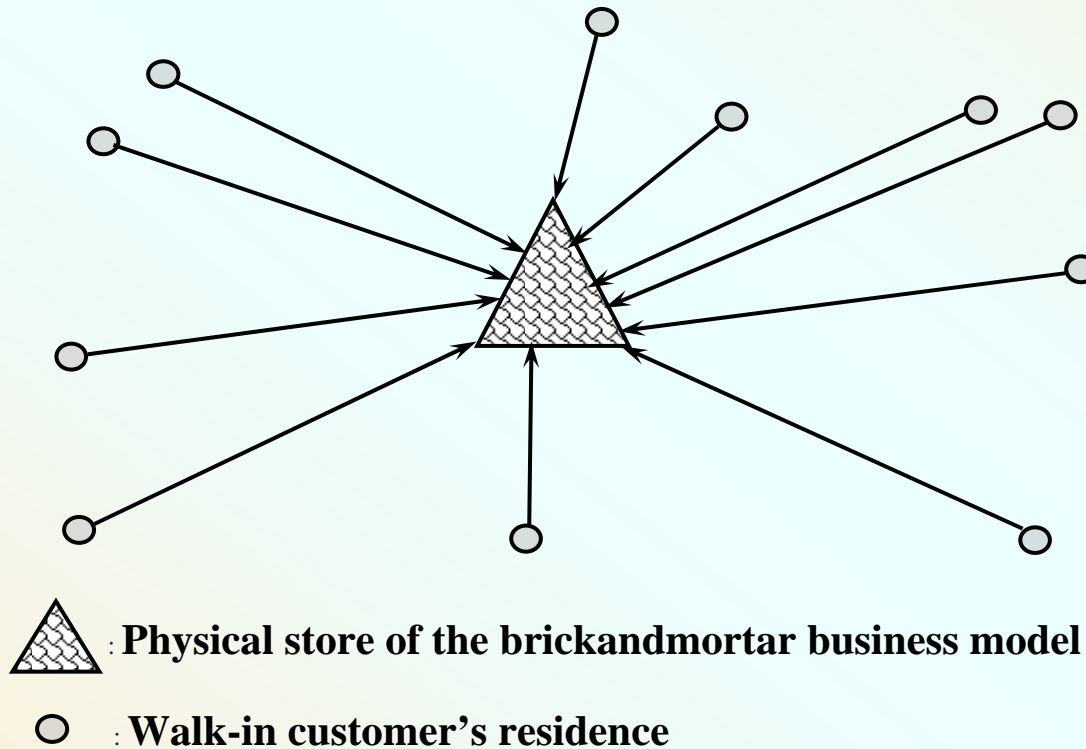
Walk-in Customers of A BM Retailer

- Traditional customers
- Directly go to the stores.
- Do not expect delivery.
- Do not go to warehouses for shopping.
- Any store can accommodate arbitrary number of walk-in customers.



Transition from bricks to clicks

Walk-in Customers Around A Physical Store





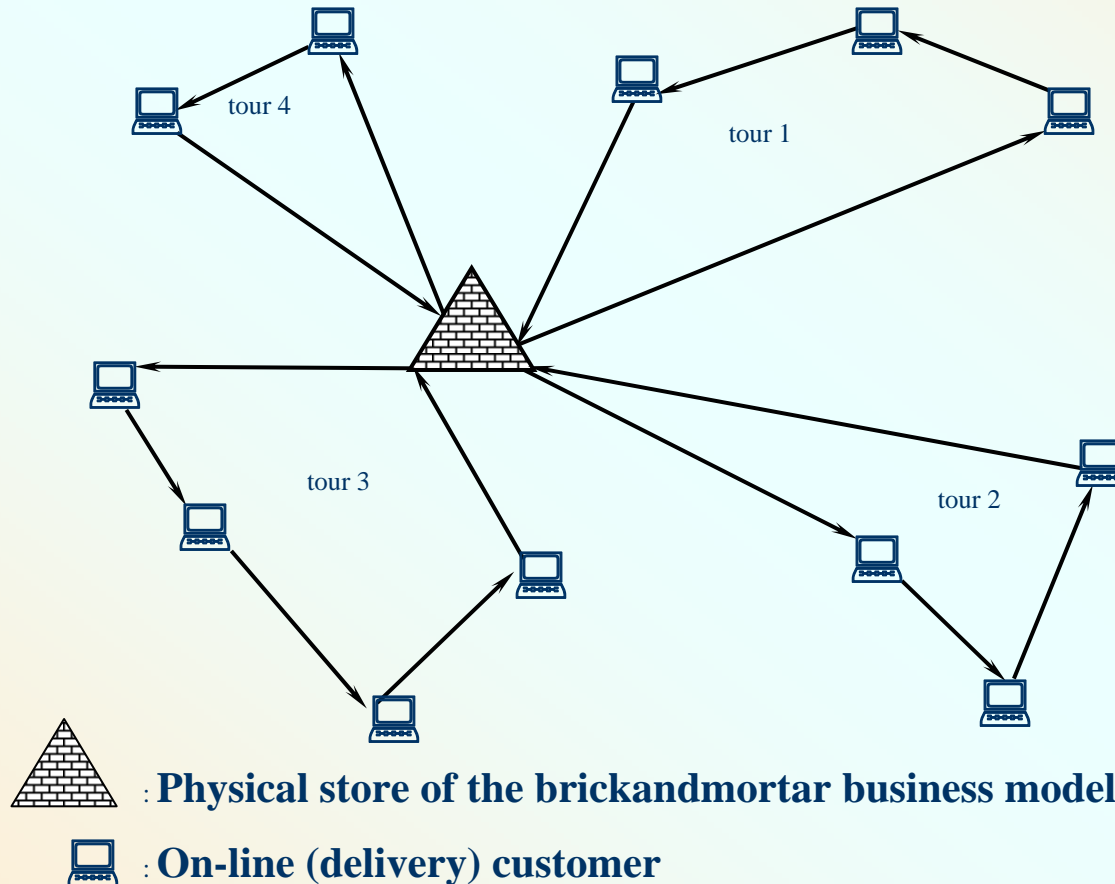
Transition from bricks to clicks

Online Customers of A CM Retailer

- Log on to the Web site of the retailer to place their orders.
- Expect prompt delivery {*thus: **time restricted deliveries***}.
 - ❖ Time window constraints (**Earliest/Latest**)
 - ❖ Deadline constraints (**Latest**)
- Can be served either from a clickandmortar store or from warehouses directly, but not from a brickandmortar store.
- **Delivery trucks**, laden with online orders, visit the residence of one each online customer.

Transition from bricks to clicks

Online Customers Around A Given Facility





Some Problems of Logistics

1. **Time restricted vehicle routing problem**
(*VRP-TR* or *VPR-TW*)
2. **Truck Fleet Problem**
 - Insourcing versus outsourcing of the distribution activities through third-party delivery channel.
 - Truck capacities: sensitivity analysis of the VRP-TR.



Some Problems of Logistics

3. Pricing and Prioritizing

- Customers having differential priorities.
- Want faster delivery? Ready to pay more?
- QoS (**Quality of Service**) guarantees on deliveries.
- A possible QoS guarantee in our problem could be:
 - ❖ Latest delivery or service completion time of each online customer



Some Problems of Logistics

4. Multisource Location-Allocation Problem

We need to decide on:

- i. **C**onversion of any brickandmortar stores into clickandmortar stores.
- ii. **C**losure of any brickandmortar stores that are operating at present.
- iii. **O**pening of new stores equipped and designed as clickandmortar stores.



Some Problems of Logistics

4. **Location-Allocation Problem (cont.)**
 - iv. **Flow of goods** from warehouses to the stores.
 - v. **Assignment** of walk-in and online customers to the appropriate facilities
 - **warehouses, BM stores, CM stores**

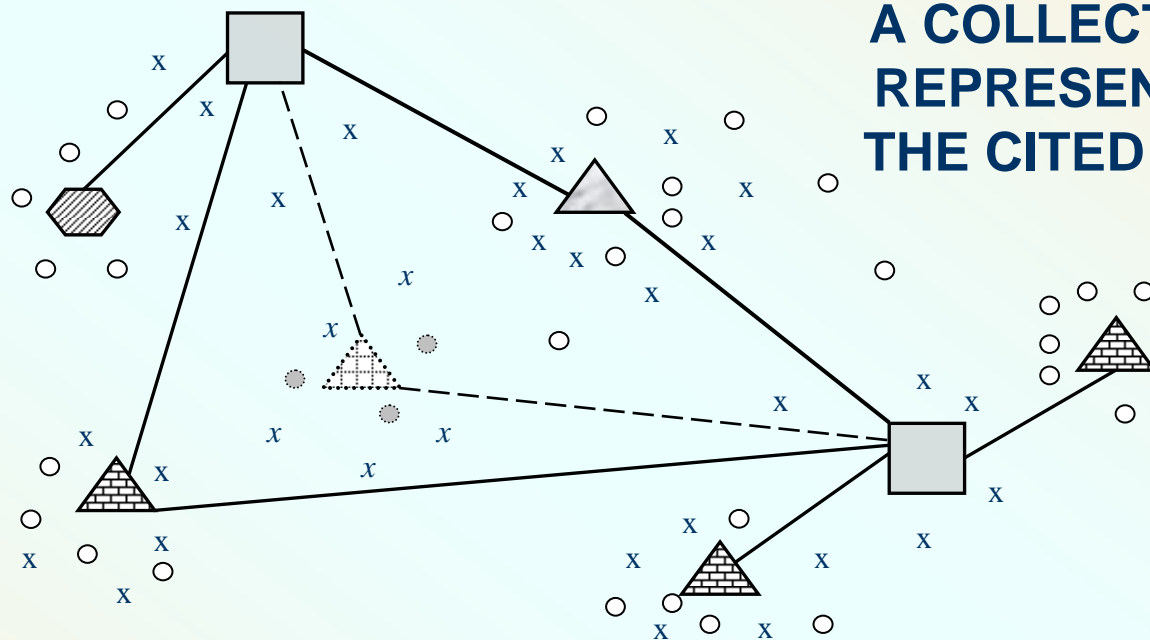
At a later stage of this problem:






the decision on third-party rental spaces and stores for the display of goods to potential customers.







Some Problems of Logistics

A COLLECTIVE REPRESENTATION OF THE CITED PROBLEMS



-  : Rental place for distribution
-  : Distribution Center (Warehouse)
-  : Brickandmortar store evolving into a clickandmortar store
-  : Brickandmortar store to be closed
-  : Clickandmortar store to be opened

-  : Walk-in customer
-  : On-line customer
-  : Walk-in customer to be served by another facility
-  : On-line customer to be served by another facility



Research Methods

- ➔ A comprehensive combined model for the first and the last of these logistics problems.
- ➔ Both the VRP-TR and the location-allocation problem are *NP-hard* combinatorial problems.
- ➔ State-of-the-art solution methods required:
 - ➔ Heuristic techniques
 - ➔ *Lagrangian Relaxation*
 - ➔ *Multi-objective optimization (Cost vs. Distance)*



Description Of A Comprehensive Mathematical Model

- ➔ **VRP-TR and location-location problem united into one comprehensive problem.**
 - **The model integrates location-allocation decisions into a multi-depot vehicle routing problem with delivery deadlines.**



Description Of A Comprehensive Mathematical Model

→ Simplifying assumptions:

- All data given a priori and known exactly.
 - ❖ All **fixed** and **variable costs**
 - ❖ Set of alternative locations for new CM stores
 - ❖ Set of present service facilities comprising warehouses and BM stores.
 - ❖ Service requirements of customers:
 - demands and delivery deadlines
- Hence, the **VRP-TR is handled as a static problem.**



Description Of A Comprehensive Mathematical Model

→ Simplifying assumptions (cont.):

- Clickandmortar or brickandmortar store serve both walk-in and online customers.
- Warehouses are restricted to deliver only to online customers and to the stores.
- Third party's rental spaces are not taken into consideration.



Description Of A Comprehensive Mathematical Model

→ Simplifying assumptions (cont.):

- Any currently operating brickandmortar store can be closed at a fixed cost.
- A new clickandmortar store's opening is associated also with some fixed cost.
- If a brickandmortar store is to serve online customers as well, it must be converted to a clickandmortar store at a certain fixed cost.
- Other operational costs of the facilities are ignored.



Description Of A Comprehensive Mathematical Model

➔ Simplifying assumptions (cont.):

- Unlimited storage and delivery capacities at the facilities.
- Tardiness or earliness of deliveries are not penalized.
 - ❖ Latest delivery time OR time window constraints are hard constraints taking care of unfavorable timing.



The Static Clickandmortar Business Model [CMBM-S]

Constraints summarized :

- (i) *Service requirements of walk-in customers,*
- (ii) *Service requirements of online customers,*
- (iii) *Balance between goods transferred from warehouses to the stores and goods delivered to online customers and sold to walk-in customers from these stores,*
- (iv) *No service to any customer from a CM store that has not been opened, or from a BM store that has been closed,*



The Static Clickandmortar Business Model [CMBM-S]

Constraints summarized (cont.):

- (v) *No service to the online customers from a BM store that has not been converted to a CM store,*
- (vi) *Constraints preventing flow of goods from CM and/or BM stores that will not be in service,*
- (vii) *Time restricted vehicle routing constraints in accordance with the previous allocation-location constraints,*
- (viii) *Nonnegativity and Integrality Constraints.*



The Static Clickandmortar Business Model [CMBM-S]

Components of the Comprehensive Objective

Function summarized :

Minimize

$$\mathbf{Z} = \mathbf{Comp}_1 + \mathbf{Comp}_2 + \mathbf{Comp}_3 + \\ \mathbf{Comp}_4 + \mathbf{Comp}_5 + \mathbf{Comp}_6 + \mathbf{Comp}_7$$



The Static Clickandmortar Business Model [CMBM-S]

Where:

$Comp_1$ = Cost of converting BM stores to CM stores,

$Comp_2$ = Cost of opening new CM stores at a set of potential location,

$Comp_3$ = Cost of closing BM stores currently operating,

$Comp_4$ = Traveling costs of walk-in customers to BM and CM stores,

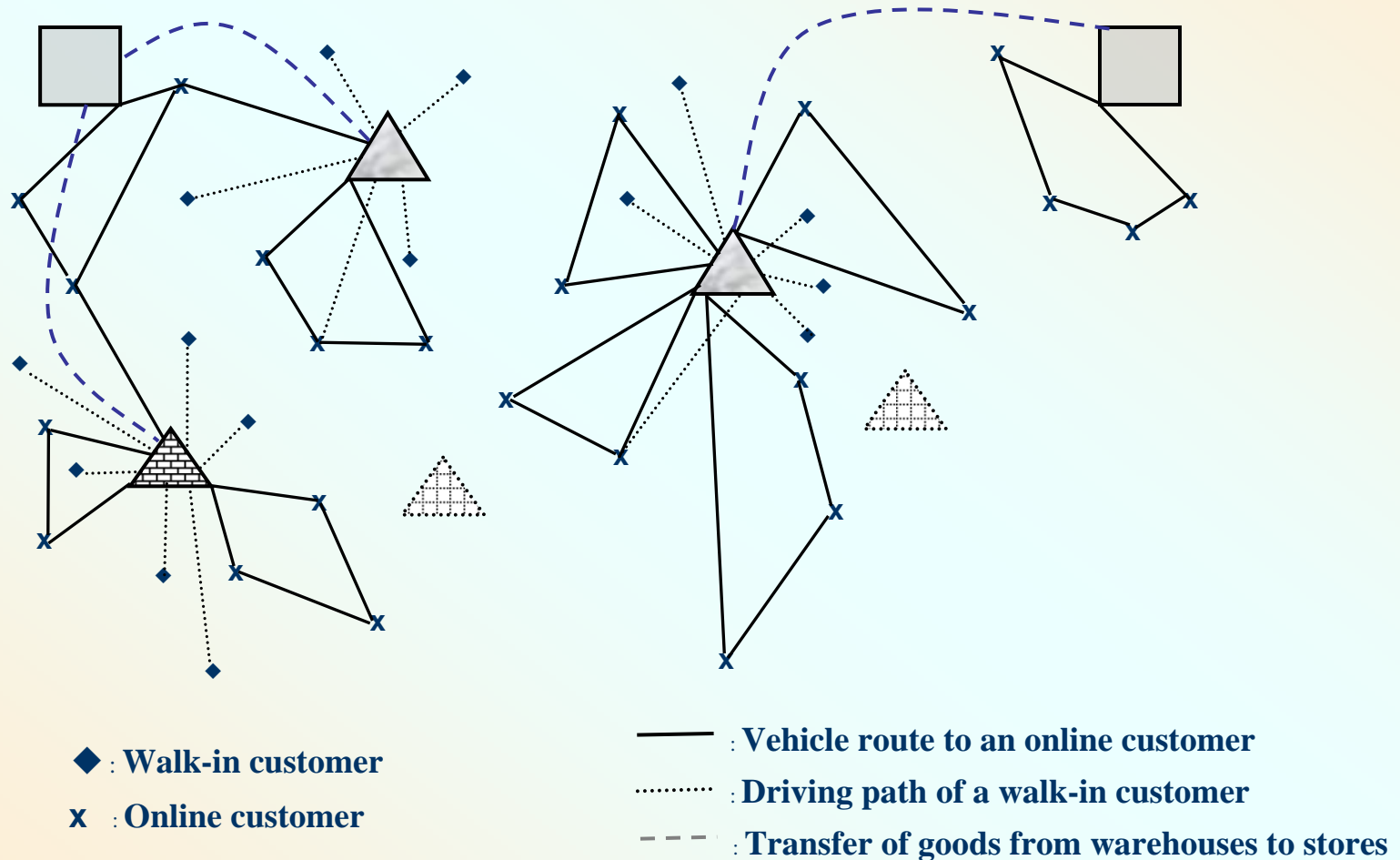
$Comp_5$ = Cost of transporting goods from warehouses to the stores,

$Comp_6$ = Cost of converting BM stores to CM stores,

$Comp_7$ = Fixed costs of vehicle acquisitions at the warehouses as well as at CM and BM stores.

The Static Clickandmortar Business Model [CMBM-S]

A picture visually exhibiting a feasible solution to the problem ECBM-Static





Expected Contributions

- ➔ Change strategy from *brickandmortar* to *clickandmortar* business model.
- ➔ Combination of the interdependent subproblems of logistics.
- ➔ Outsourcing of the distribution activities
 - ➔ Outsourcing would obliterate the VRP-TR subproblem of the comprehensive model.



Future Research Directions

Real-Time Strategy Making

- ➔ Dynamic arrivals of orders from online customers.
- ➔ Unexpected traffic disturbances in the extreme case.
- ➔ Assignment of vehicles to customers and deliveries of their orders on a real time basis.



Future Research Directions

Real Time Multi-Period Strategy Making

In addition to the real time model:

- ➔ A real time planning horizon of multiple periods.
 - ➔ The decisions that are made in a previous period affect the decisions to be made in the next period.



Recently:

vs. Walmart.com



Amazon.com isn't what it was used to be even a year ago...



amazon.com.

Recently:

WELCOME

STORE DIRECTORY

vs.

Walmart.com

What's cookin'?

FREE SHIPPING
on all Kitchen orders over \$99.
Restrictions apply. See Web site for details.

Braun MR430HC
Multiquick Deluxe Hand Blender & Chopper
\$29.99

Waring MBB518
Professional Bar Blender
\$149.99

Henckels Pro 5
9-Piece High Carbon Stainless Steel Knife Set with Block
\$329.99

Demarle Silpat
11-by-17-Inch Nonstick Baking Sheet Liner
\$21.99

Kitchen

Hundreds of top brands to choose from:

calphalon • cuisinart
farberware • fiestaware
hoffritz • j.a. henckels
kitchenaid • krups • le creuset
oneida • oxo • pedrini
silverstone • waring

It's bound to lead to good things.

Calphalon Professional Nonstick II 10-Piece Cookware Set
\$389.99

Le Creuset 5-1/2-Quart Round French Oven
(6 colors)
\$149.99

Hoffritz Stainless Steel Fondue Set with 6 Forks
\$49.99

Kaiser Bakeware Noblesse Nonstick Mini Springform Pans, Set of 4 (4-1/2-Inch)
\$14.99

Cookware

Selling kitchen utensils and cookware???

Wait a minute! You want to compete with someone else too?



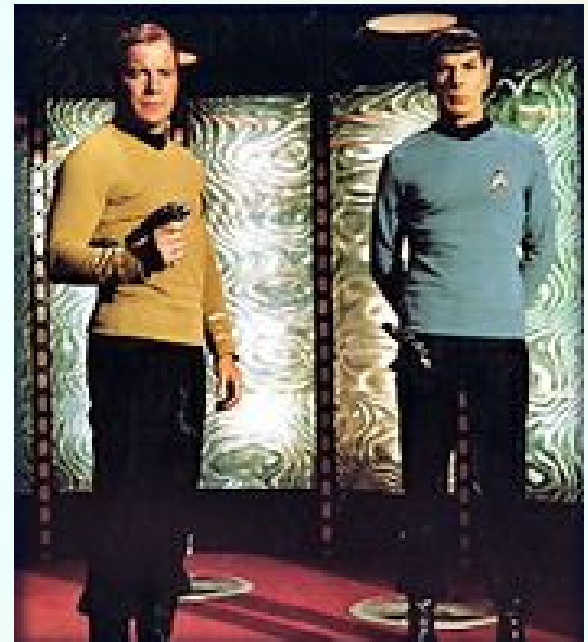
Motivation of the Quest

Thus, the problem of the

METAMORPHOSIS
FROM “BRICKANDMORTAR” TO
“CLICKANDMORTAR”
BUSINESS MODEL

will be pursued in the arena of the new
economies...

...as long as teleporting is not an option...



What do you want to ask today?



Courtesy of
Cartoonist
Selçuk Erdem