

emerontl 6

KnHsxan²kgkarRKbRKgbeckvTüa

Critical Factors in Managing Technology

I-eKa l bNgénemeron

Krr l kpgEdrfakgmeronT4ngT5eyg)ansksaEpksxanBrén Technology Coin K Technology Components ng Technological Capabilities Ed l CaFatca)ackgkarbegltngbeginsmtPaB beckvTüarbsGgPaBnmy² kgmeronTl6enHngbEnmnvKnHsxan²Ed l GkRKbRKgRtvBcarNakg kargarRKbRKgbeckvTüaeGaymanRbsTPaB. bnabBbBabemerontl6enHnsStngGacedysnr dcxagerkam³

- e tGCaKnHsrabcatEcgbeglteGaymanbeckvTüa?
- e tGkRKbRKgRtvKtKre l ktaGxHedlm, lCrm j eGaymanKntécRbDt?
- e tGkRKbRKgbeckvTüaRttEsgy l GBGxHedlm, lbeginRbsTPaBRKbRKg?
- e tmanyTsarSGxHsRmabGkRKbRKgRtvymkGnvtedlm, lna ykbeckvTüaeTakanTípSar?
- Esgy l Binnakarpasbrén] sSahkmmycnnEd l mnKreGayeCO.

II-esckepm

beckvTüaekttec j BKntécRbDtrbsmnsS. karRKbRKgbeckvTüaBakBneTAngkarbnkar xtxbegtbeckvTüa GPvDÄnp l tp l f² ngna ykbeckvTüabp l tp l TagenaHeTakanTípSareday eCaKCy. dcenHvaTamTaeGaymankarécRbDtxsbptCamyingkarrkrkvfbegltvapgedr. karRsav RCavngGPvDf(R&D)CameFüa)aymyCydl GgPaBkgkarbeginkarEkécnngGPvDf: p l tp l. Etkar RsavRCavngGPvDfCakarcNa ymy dcenHvaCakarRbfyRbfanmyEd l GkRKbRKgTamTarkarRKbRKg RbkbedayPaBRtmRtv.

II-KnHsxan²Ed l GkRKbRKgRtvBcarNa kgkargarRKbRKgbeckvTüa

-The Creativity Factors

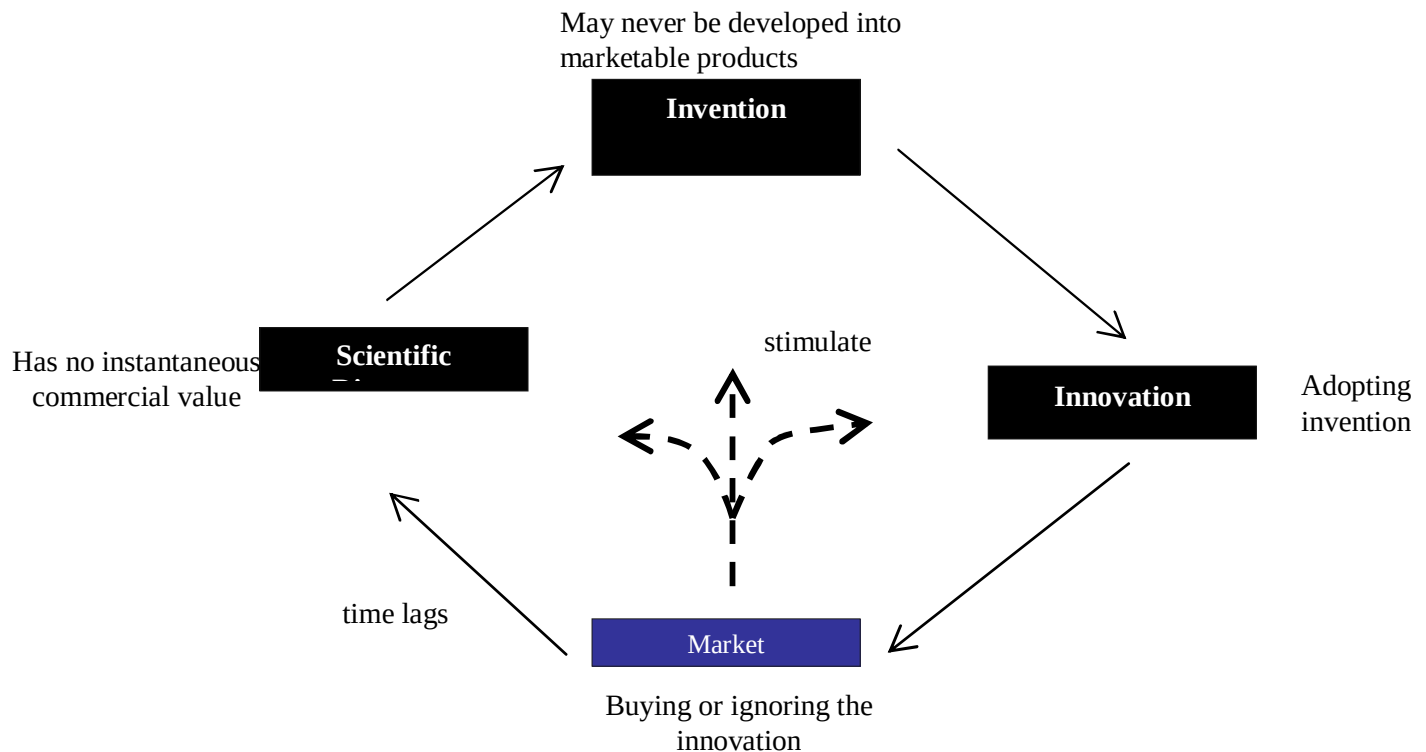
e teFdcemcedlm, l begt)anp l tp l beckvTüa? enHCasnrmyEd l GkRKbRKgRtvTT l xsRtv. p l tp l beckvTüaekttec j BKntécRbDtrbsmnsSdcBakümyXafa “Technology is an

expression of human creativity”.

enAeB lnyayBBaküfakarécRbDt (Creativity) kgGtnyén Technological Change Bakü2
Rtv)ane lkmkBPakSaK³

-Invention CakarbegltnvbeckvTüa fBrbkKehj énvTüasaRs. vaGacCaKntEd lmnFab
manBlnnbkarbegltnvGmyEd lfbptsrabBPBe lak. vaGacCap ltp l ceNHdg b
RbBnepSg²Ed lBlnmnFabman.]TahrN masineRbchayTk Transistors masin
Kte l x Caedlm. lTp lén Invention ektec j BvTüasaRsngkarRbmryrbsmnsS.

-Innovation Cakarbegltp ltp l esvakm ngteNrkarepSg²Ed lficeBaHGgPaBmy. kar
Innovation eFeLgedm, beB jesckkarrbsGtfCn ngbErbr lsgmtamry³beckvTüa
Ed lmanRsabngkarRbDitf ehylvamnEmnCarbsEd lficeBaHBPBe lakenaHeT. Bakü
Invention ng Innovation mndckaeTetvamanTnakTngngKa. Invention epate lRBtkar
Ed l ektman É Innovation epate lteNrkar. smRbeLkemi l Diagram xagerkam
GBTnakTngénvTüasaRs Invention and Innovation.



Link between science & technology

Science, Invention ng Innovation manTnakTngeTAV jeTAmk. vTüasaRsskSaBGEd lFmCat
)anbegiteLg karsskSaenH)anbegiteGaymanrbkKehljvTüasaR ehlyrbkKehlj enHRtv)anGk
beckvTüaeRbR)askgkarRbDtnvvtGmyEd lBPBe l akmnFabmandakc leTATipSar. TipSarngTT l b
mnTT l bNa leGaymankarécRbDtb)anekiteLg. enAeB l karécRbDtf²)anekiteLg va)anCRmj
ngCyd l karRsavRCavrbsGkvTüasaRseTAV j.

RbePTén innovation (Types of innovation)

Innovation eRcneFeLgedm, lbeB j bEnmbbEnmtémceBaHp l tp l besvakm. Innovation
EbgEckec j CabRbePTK³

-Radical breakthrough innovation

Ca Innovation Ed l manm l dane l l invention,]TahrNkarbegt Semi-conductor, Transistor, IC,
karpasbreGRkgkBüTrBl CRT to LCD Caedlm.

-Incremental or evolutionary innovation

Ca Innovation Ed l eFeLgCaSxanedm, Ek l Grp l tp l esvkmEd l manRsabeGaykanEtRbesr
]TahrNkarektman IBM Portable PC in 1981 Ca Incremental eRBaHkBüTrmantagBqa 1943
mkemH, Windows technology (MS-Windows 2000, XP, Vista...)

-Routine innovation

CakarEkécGmyfisarabGgPaBmyEd l vaRsedogeTAngGEd l manBmnrcmkehly.]TahrNRbBn
RKbRKgvtmanbK l kBmncHhtae l xa eRkaymkman Punch Card eRkaymkeTotmanerbCarbBn
DQtal Fingered Print.

-Creativity and innovation

Innovation – creation of value or satisfaction of a customer need.

Creativity – engine of innovation

mannyfaedlm,)anp l tp l f²ngmannrnPaBGaCvkm RkmhnRtvman Innovation. edlm,man

Innovation eygrtvkarCaca)acnvKnt Creativity. Creativity CakarbnSrvagKntBirbeRchedm, l

begt)anGmyfEd l sgmRtvkar. eKRtveFl Innovation edlm,³

-edaHRsainvkhSBp l tp l mn to fix a previous problem

-EksRm l p l tmneGaYSmSbtambeckvTüa fngsgmbcb, n to adapt with new
technology or new society

-TbsatkargakerrbsGtfCn to block customer switching cost...

smcgcafa Creativity BgEpKTagRsgelITagFnFanmnsSngbryakaskargar.

etlbryakaskargaryagdcemcEd l GaceFGgPaBeBa l eB j eTAeday Creativity?

- l kN³énbryakas Creativity enAkg Organization

GkRKbRKgGacBcarNanvcncdcxagerKamedm, l begiteGaymanbryakas Creativity enAkgGgPaB³

-GnBaa teGaybK l keFkargareTAtamkarcabGarmNrbsBkeK

Permits people to work in areas of their greatest interest.

-e l kTkctbK l keGaymanTnanTngyagT l ayCamymtrmkargarbmtrmvKbNHbNa l nana

Encourages employees to have broad contact with stimulating colleagues.

-GnBaa teGaybK l kxanRbfyceBaHkarGnvtkargarmycnn

Allows taking moderate risks.

-GteGanceBaHkhsmycnnrbsbK l k ng

Tolerates some failures.

-TT l khssa l ceBaHcnc l rbsbK l kngmankare l kTkctCakarp l rganCaedlm

Provides appropriate rewards and recognition.

-karnaykp l t p l fcl l TpSar Bringing innovation to market

kakNtry³eB l énkarnaykp l t p l fcl l eTakanTipSarCaKnHdsxanrbsGkRKbRKgbeckvTüa

ngCaGavFkgkarRbktRbECgyagmanRbsTPaB. mannyfaGkRKbRKgRtvKtfaetenAeB l Na

Ed l eygKrbBanp l t p l fcl l TpSar? eRBaHRbsnebmankarytyavenaHkrRbktRbECgngGac

deNmTipSarrbseyg ehyRbsnebe l OneB l p l t p l fingeTARbktCamyp l t p l casrbs

eygv j Camnxan. dcenHehymasbeckvTüa f²CaeRcnBüayamBnüaeB l lbbegne l , Óénkarna

ykp l t p l frbsBkeKeTakanTipSaredayeFiyagNaedlm, l Ta j ykkarcen j BTipSarGayGsBl l T

PaBsn l]TahrN Osborn Computer Company)atbgPaBCamasénbeckvTüaeday sarPaB

ytyavénkar INOVATEp l t p l rbsxnerkayman Feedback BGtfCnfap l t p l manerogtc

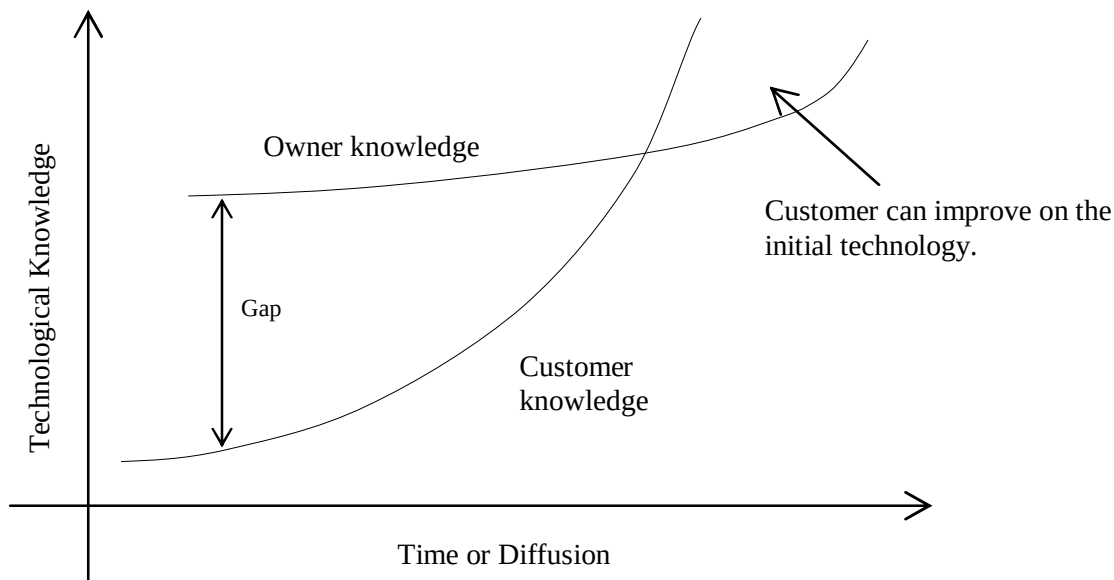
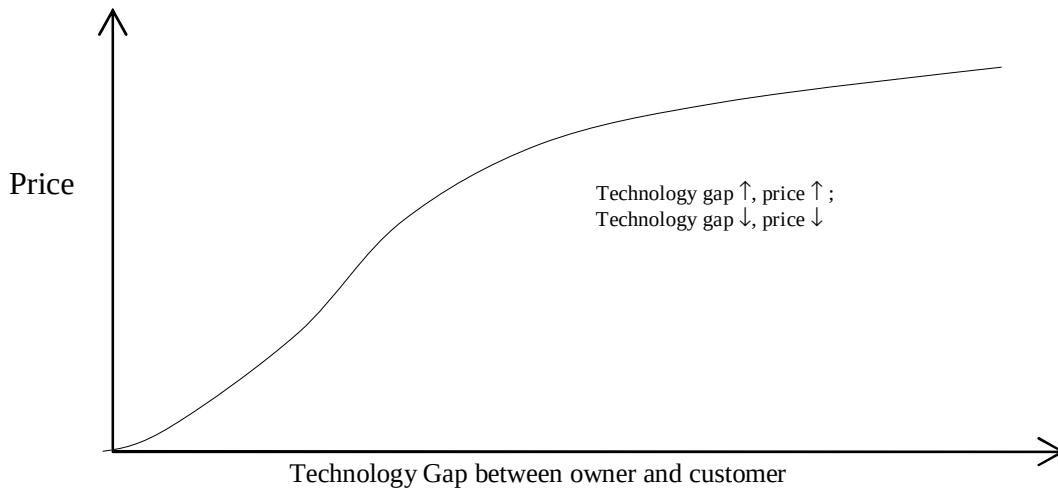
eBkB)akerbR)as, e.g. Bill Gate's timing of announcements of new releases causes

consumers to delay purchasing other options, thus blocking competitors' efforts to obtain market share from MS.

karKNnary^{3eB} l énkarnaykp l tp l feTakanTípSarCacncKnHmyeTotEd l GkRKbRKgbeck -
vTüaKrykctTk dak ehyvamankarBakBneTAngTnakTngnvagbeckvTüangté l Ed l eyngg
BPakSaxagerKamenH³

ska l The sooner an innovation reaches the marketplace, the sooner a company can reap its rewards.

-TnakTngnvagbeckvTüangté l Technology-price relationship



RkaPcxage l l bga j faté l énbeckvTüangmanté l xsenAeB l K l atceNHdgrbsGkerbR)as
beckvTüaenAqayBbeckvTüa. pyeTAv j té l énbeckvTüaFakchenAeB l GtfCnkanEty l dgBl
beckvTüa. ehtdcenHehy)anCae y gEtsgteXj manp l tp l beckvTüamycnnmanté l xsenA
erobcngbergoneday Qn Parn

eB l crTipSartbg kgry^{3eB l 1eTA3Exbnabp l tp l enahngcHe fakv j edaysar} (1) Rkmhnngna
 ykp l tp l fc l (2) GtfCncabepmCnNayngp l tca senaH_cK l atceNHdgrbsGkerbR)as
 bekvTüaxtCtbeckvTüa).

-karRKbRKgkarpasbr Managing change

GkRKbRKgEd l manPaBvyqatrtvykTkake l karvvTERbRb l TagmCÄdanxagkgngxagerKA eRBaH
 karERbRb l xagerKA Gacpasbr\ryabTrbsGtfCn bGacektmanCap l tp l Cns. GkRKbRKg
 bekvTüaRtvEtmanstPaBdgngRbtkmceBaHkarERbRb l xagerKAeGay)anc,asngrhstamEd l Ga
 ceFeTA)an. smBntü]TahrNmyrbskrNl Kodak Company CaRkmhnEd l manRbCaRbyPaB
 xsbptceBaHkarp l th l ftrbkgTsSvtS90 Rkmhn)ancna ye l R&D yagerCnedlm,eFiyagNa
 eGayKNPaBhsrbseK l CagKrRbECg EtGEd l eFeGayRkmhnbraCyKkarbegiteLgnv Chip
 Memory (Digital Camera) edayRkmhnepSgCnskareRbR)ash l rbs Kodak. xagerkamCannakar
 pasbrén]sSahkmEd l GkRKbRKgKrBcarNa³

Changing Trends in Industry

	Factor	Traditional	New
1	Life cycle	Long life cycles	Short life cycles
2	Innovation	Few	Continuous
3	Competition	Expected; Competitors are the enemy; Cooperation not allowed	Stronger; Alliance with competitor accepted
4	Market	Expected; Local	Uncertain; Global
5	Quality	Desirable	Imperative (hygiene factor)
6	Production	Mass; no commitment to suppliers; large inventories; fixed manufacturing	Customerized; suppliers are partners; reduced inventories; flexible manufacturing
7	Organization	Large corporations vertically; integrated companies; bureaucratic organizations; financial methods control the	Smaller plants; companies rely on outsourcing; nimble organizations; financial methods to serve the

		organization	organization's objective
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-yTsRs Technology leaders or followers

cNcsxanmyeTotEd lGkRKbRKgbeckvTüaRtvyl dgKyTsarsedlm,lnaykbeckvTüaeTakanTl
pSar . GkQHKCaGkKCaGkEd lGacna ykbeckvTüaeTakanTl pSar)anmn b? sBé fmanRkmhnCaeRcln
)aneRClerlsyTsarsBirmkGnvtk³

-A leader KCarKmhnd lRsavRCavngbegltp ltp lbeckvTüaehynac l eTATl pSartbgeK

-A follower KCarKmhnd l sLgeml p ltp lEd lmanenAe lTl pSarrceFRtabtam .

Follower TagtamCabCancCacmy Leader edlm,Es gy lfaGEd l Leader ngnamkCabn .

yTsarsTagBrxage lGacmanKNsm, tngKNvbtcdKa ehymnR)akdfa Leader EtgEteCaK

Cyehy Follower EtgEtbraCyenaHeT .

KNsm, trbs leader innovation (Advantages of being a leader innovation)

-mankarTT lsa lmn (Name recognition)

-GacQreCg)anmnmannyf aeRClerls Target Market)anmn (Better market position)

-man»kaskgkarkNtbTdan]sSahkm)anmn (a chance to define the industry standard)

-TT l)anbTBesaFnmn (A head start on the learning curve)

-mankarkarBartampbc,ab)anmn e.g. through patents (Protective barriers)

-manR)akceN jxseday sarKnatceNHdgrbsGkeRbR)asbeckvTüa ngp ltp lbeckvTüaman

krtxs (High profit due to technology gap between customers and products)

-mansmtPaBTbsatkargakerrbsGtfCn (Delayed customer switching thought Customer Loyalty)

-mankaryke lIkTkctBrd aP)a l bédKrnana (Favorable response by outsiders Supports from government, venture capitalists, other industrialists.)

KNvbtén leader (Disadvantages of being a leader)

-mancNayxseTae lkarRsavRCav karkNtbTdanepSg² ng karsak l ,gTl pSarCaedlm (Large cost associated with research, prototyping, testing and overall development)

-mancNayxseTae lkarGPvDfbeckvTüa (Costs associated with updating the technology)

- karcabepimmankarB)akedaysarmnTanmanbTBesaFn (Initial investment in design, tooling and production may create difficulty, if a competitor introduce a better technology or an improved design)
- TipSarmnBtR)akdhakbdcCakarsak l,g (Market uncertainty)
- CapagsbrbsGkRbECg (As a target for competition)

Outcome from innovation process

	Innovator	Follower
Win	- Pilkington (Float Glass) - G.D. Searle (NutraSweet) - Du Pont (Teflon)	- IBM (PC) - Matsushita (VHS format for CR) - Seiko (Quartz watch)
Lose	- RC Cola (Diet Cola) - EMI (Scanner) - Bowmar (Calculator) - Xerox ("Star") - DeHavilland (Comet)	- Kodak (Instant photography) - Northrup (F20) - DEC (PC)

eti leaders RttveFyagdcemcedm,rkSaPaBCaLeader-enAkgtipSar? How can innovation leaders sustain their leadership ?

- n To invest in R & D to continue the development of technology.
- n To build technological resources.
- n To diffuse their own technology while delaying competitors from getting into the technology.

eti follower RttveFyagdcemcedm,TTI l)anPaBeCaKCy? How can a follower firm do ?

- To examine a leader's product and to attack it at its weakest point.
- To have lower initial investment in R & D.
- To improve on what already exists.

Introducing environmentally Friendly Technologies

Technology that not harm to the world and human. Some fundamental principles are as follows:

- Reduce, Reuse, Recycle and Replace the use of natural resources (the 4 R)
- The selecting technology consider Economic Feasibility, Endowment Rationality and Environment Sustainable (the 3 E)
- Use Green Technology

Example: Using less polluting and less hazardous raw materials

In October 1990 McDonald's in US switched from plastic clamshell hamburger boxes to paper wrappers (Recyclable and biodegradable)

-Example : Modifying products to minimize use of hazardous materials and processes

Many pharmaceutical companies now try to use water-based coating instead of solvent based coatings for tablets. This reduces solvents spray emissions into air.

Discuss Questions

1-Identify a company that changed from being a follower to being a leader. What was its approach? How long did they take?