알고리즘 마케팅 12강

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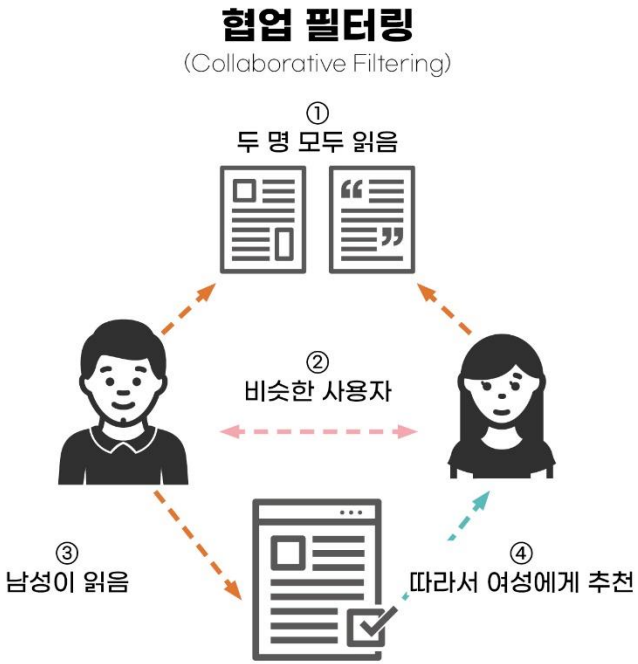
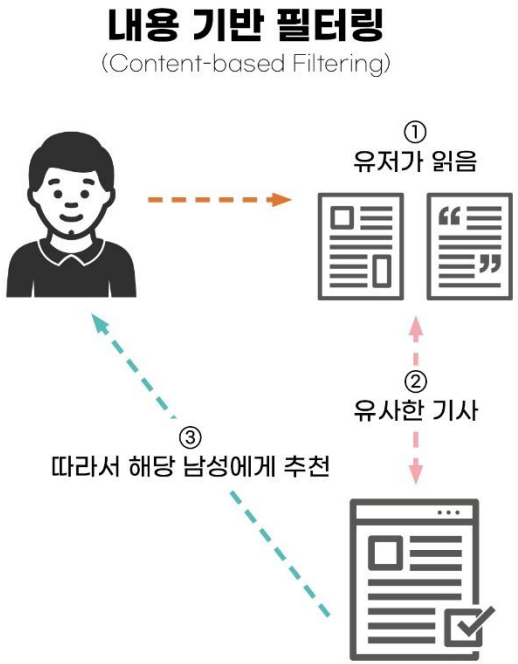
오늘의 강의

- 11차시 강의 Review
- ESG
- Choice theory: Prospect theory
- Bass Diffusion Model
- 개인 프로젝트 관련 안내

추천 (Recommendation)

- **추천 기법의 개관**
  - 콘텐츠 기반 필터링: 아이템의 콘텐츠 데이터에 의존
  - 협업 필터링: 고객 평점 행렬 내의 패턴에 의존
  - 하이브리드: 핵심 알고리즘들의 결합
  - 맥락 기반 추천: 시간, 장소, 마케팅 채널 등과 같은 맥락적 정보까지 반영





추천 (Recommendation)

- **콘텐츠 기반 필터링의 장점**
  - 1. 사용자 데이터로부터의 독립성
    - 전체 사용자 수가 적거나 수집된 전체 평점 수가 적을 경우에 매우 유용
    - 독특한 취향을 가진 고객에게도 좋은 추천 서비스를 제공 가능
  - 2. 새롭고 희귀한 아이템
    - 고객 평점이 거의 없는 새로운 또는 희귀한 제품의 추천이 가능
    - 롱테일(long tail)의 맥락에서 볼 때 매우 중요한 장점

추천 (Recommendation)

- **콘텐츠 기반 필터링의 장점**
  - 3. 다른 카테고리의 추천
    - 고객 구매 패턴의 유사성만 가지고 추천한다면 다른 카테고리를 추천하는 결과가 잘 안 나올 가능성 있음. → 특히 여러 카테고리에 걸쳐 구매를 한 고객이 적을 경우
  - 4. 해석 가능성
    - 추천 결과를 고객에게 설명하기에 유용
    - 예: 영화 추천의 경우, “A라는 일본 액션 영화를 좋아하셨기 때문에 B라는 일본 액션 영화를 추천합니다.”

추천 (Recommendation)

- **콘텐츠 기반 필터링의 단점**
  - 1. 콘텐츠 특징(feature) 추출의 문제
    - 유사성 측정의 대상이 되는 콘텐츠 특징 추출 결과의 품질은?
    - “인간의 취향”을 제품의 기본적인 속성 등으로 쉽게 표현할 수 있는가?
    - 콘텐츠를 구성하는 텍스트, 이미지 등으로부터 특성을 적절하게 추출할 수 있는가?
  - 2. 신규 사용자 추천
    - 과거 데이터가 없는 신규 사용자에 대한 추천 서비스가 어려움.
  - 3. 사소한 추천
    - 참신하지 않은, 또는 우연적이지 않은 추천을 할 가능성이 상대적으로 높음.

추천 (Recommendation)

- **협업 필터링의 장점**
  - 1. 아이템 콘텐츠의 추가 정보 없이도 추천 시스템 구축 가능
  - 2. 고객의 암묵적/심리적 프로파일의 활용 가능
    - 고객 행동 패턴으로부터 고객의 기호와 판단을 유추 가능
  - 3. 사소하지 않은 추천의 가능
    - 관측되지 않은 고객의 프로파일을 활용하기 때문에 참신한 혹은 우연적인 추천이 가능

추천 (Recommendation)

- **협업 필터링의 단점**
  - 1. 과거 데이터가 부족할 경우
    - 상당한 양의 신뢰할 만한 고객 평점 데이터가 구축된 상황에서만 제공 가능
  - 2. 새로운 사용자와 아이템의 경우
    - 과거 평점 기록이 없는 새로운 사용자나 새롭게 제공되는 아이템의 경우 예측이 어려움.
  - 3. 인기도 편향 / 추천 제품의 표준화
    - 평점 데이터의 패턴에 기반을 두고 추천하기 때문에 인기 있는 아이템이나 ‘대중적인’ 아이템이 추천될 가능성이 높아짐.

추천 (Recommendation)

- **Recommendation system in Marketing: A. Ansari, S. Essegaier, and R. Kohli (2000), Internet recommendation systems, *Journal of marketing research*, 37(3), 363-375.**
  - We use a hierarchical Bayesian approach to design a recommendation system.
    - To allow *unobserved heterogeneity* in consumer preferences
    - To assess the effect of *unobserved product heterogeneity* on preferences to allow for the introduction of unobserved product attributes
  - We suggest that preference models can offer good alternatives and this approach allows statistical integration of five types of information useful for making recommendations: a person's expressed preferences, preferences of other consumers, expert evaluations, item characteristics, and individual characteristics.

추천 (Recommendation)

- **Recommendation system in Marketing: A. Ansari, S. Essegaier, and R. Kohli (2000), Internet recommendation systems, *Journal of marketing research*, 37(3), 363-375.**
  - Customer heterogeneity

The observations for each customer are used to specify a customer-level regression model:

(1) $$r_{ij} = \mathbf{w}_j\boldsymbol{\beta}_j + e_{ij},\ e_{ij} \sim N(0, \sigma^2),$$

where $j \in M_i$, $\mathbf{w}_j$ is a vector of movie attributes (genre and expert ratings) for movie j, and $\boldsymbol{\beta}_i$ is a vector of parameters that represent the preference structure for customer i.

(2) $$\boldsymbol{\beta}_i = \mathbf{z}_i\boldsymbol{\mu} + \boldsymbol{\lambda}_i,$$

for i = 1 to I. In Equation 2, $\mathbf{z}_i$ contains the characteristics of customer i, and $\boldsymbol{\lambda}_i$ represents the unobserved customer effect for the ith customer.

추천 (Recommendation)

- **Recommendation system in Marketing: A. Ansari, S. Essegaier, and R. Kohli (2000), Internet recommendation systems, *Journal of marketing research*, 37(3), 363-375.**
  - Product heterogeneity

Let $C_j = \{i_1, i_2, \ldots, i_{nj}\}$ represent the index set of the n_j customers who rated movie j. Let r_{ji} represent the rating given by customer i for movie j, where $i \in C_j$. The number of customers that provide ratings for a movie varies, which yields an unbalanced data set. The observations for movie j can be used in specifying a movie-level regression model as follows:

$$r_{ji} = \mathbf{z}_i'\boldsymbol{\beta}_j + e_{ij},\ e_{ij} \sim N(0, \sigma^2), \tag{4}$$

$$\boldsymbol{\beta}_j = \mathbf{w}_j'\boldsymbol{\mu} + \boldsymbol{\gamma}_j,\ \boldsymbol{\gamma}_j \sim N(\mathbf{0}, \boldsymbol{\Gamma}), \tag{5}$$

for j = 1 to J. The vector $\mathbf{w}_j$ contains the observed movie characteristics, and $\boldsymbol{\gamma}_j$ represents the unobserved movie effects. The complete model can alternatively be written as

Table 2
MODEL COMPARISON STATISTICS

Models		*Log-Marginal Likelihood*	*DIC Statistics*		
Heterogeneity	*Movie Attributes*		*Fit D*	*Complexity pD*	*DIC*
No heterogeneity	Genre only	−18,801	37,589	13	37,602
	Expert only	−18,398	36,788	8	36,796
	Genre and expert	−18,327	36,638	17	36,655
Customer heterogeneity	Genre only	−17,581	34,135	1020	35,155
	Expert only	−17,162	33,429	900	34,329
	Genre and expert	−16,909	32,215	1501	33,716
Movie heterogeneity					
	Genre only	−18,072	35,825	275	36,100
	Expert only	−18,067	35,834	259	36,093
	Genre and expert	−18,066	35,830	260	36,090
Movie and customer Heterogeneity	Genre only	−16,793	32,118	1390	33,508
	Expert only	−16,840	32,502	1146	33,648
	Genre and expert	−16,675	31,488	1717	33,205

Notes: All models include demographic variables.

가격 (Pricing)

- **Kamakura, W. A., & Russell, G. J. (1989). A probabilistic choice model for market segmentation and elasticity structure. *Journal of marketing research*, 26(4), 379-390.**
  - Random utility theory

$$U_{jkt} = u_{jk} + \beta_k X_{jkt} + \varepsilon_{jkt}$$

    - For a brand *j*, consumer *k*, and purchase occasion *t*,
    - u_{jk}: the intrinsic utility or value of brand *j* for consumer *k*
    - X_{jkt}: the net price of brand *j* for consumer *k* at time *t*
    - ε_{jkt}: random error (i.i.d. Weibull)

가격 (Pricing)

- **Kamakura, W. A., & Russell, G. J. (1989). A probabilistic choice model for market segmentation and elasticity structure. *Journal of marketing research*, 26(4), 379-390.**
  - Competitive structure
    - 2. In terms of price sensitivity, we can determine whether choice shares within a segment are due to *preferences for each brand or to price sensitivity*, because we estimate the “intrinsic preference” of brands.

$$\eta_{jj}^{i} = \beta_i\left(1 - S_{ij}\right)X_{j*}$$

$$\eta_{jj'}^{i} = -\beta_i S_{ij'} X_{j'*}$$

가격 (Pricing)

Table 3
PREFERENCE SEGMENTATION AND PRICE SENSITIVITY

	Loyal segments				*Switching segments*[a]				
	A	*B*	*C*	*P*	*1*	*2*	*3*	*4*	*5*
Choice probabilities									
A	1				.790	.219	.152	.095	.192
B		1			.089	.646	.259	.238	.332
C			1		.069	.092	.520	.301	.133
P				1	.052	.043	.065	.367	.343
Segment size (% of all households)									
	19.0	5.8	3.9	2.7	9.3	9.7	25.8	16.4	7.4
Price sensitivity									
β					−1.87	−1.44	−3.07	−5.42	.37[b]

[a]For switching segments 1 through 4, purchase probabilities greater than .10 are underlined.
[b]Price coefficient statistically *insignificant* at the .05 level.

가격 (Pricing)

- **Gupta, S. (1988). Impact of sales promotions on when, what, and how much to buy. *Journal of Marketing research*, 25(4), 342-355.**
  - The effectiveness of a sales promotion can be examined by decomposing the sales “bump” during the promotion period into sales increase due to brand switching, purchase time acceleration, and stockpiling.
  - This study proposes a model for such decomposition whereby brand sales are considered the result of consumer decisions about *when, what, and how much* to buy.
    - Brand switching: 84% of sales increase
    - Purchase acceleration in time: 14% of sales increase
    - Stockpiling: 2% of sales increase

가격 (Pricing)

- **Gupta, S. (1988). Impact of sales promotions on when, what, and how much to buy. *Journal of Marketing research*, 25(4), 342-355.**
  - The brand choice model: the multinomial logit model

$$P_{ijn} = \frac{\exp(b' X_{ijn})}{\sum_{m=1}^{M} \exp(b' X_{imn})}$$

  - The interpurchase time model: Erlang-2 distribution model

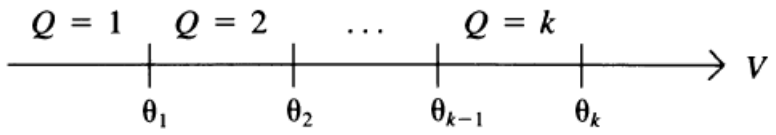
$$f_{iw}(t) = \alpha_{iw}^2 \, t \, exp(-\alpha_{iw} \, t)$$

Where $\alpha_{iw} = \exp(-c' Y_{iw})$

가격 (Pricing)

- **Gupta, S. (1988). Impact of sales promotions on when, what, and how much to buy. *Journal of Marketing research*, 25(4), 342-355.**
  - The purchase quantity model: Ordinary regression model with latent variables
    - For latent variable V for the observed ordinal response variable (purchase quantity) Q,

$$V = \beta' Z + \varepsilon$$



where:

(6) $Q = k$ if $\theta_{k-1} < V < \theta_k$

$Q \leq k$ if $V \leq \theta_k$

$$P(Q_{in} = k) = P(Q_{in} \leq k) - P(Q_{in} \leq k - 1)$$

서비스 실패 (Service Failure)

- **서비스 실패**
  - 유형의 제품에 문제가 발생하는 경우와 같이, 서비스도 생산과 전달 과정에서 문제 발생 가능
    - 서비스 실패: 서비스 접점에서 고객의 불만족을 초래하는 서비스 약속 불이행이나 실수이며, 서비스 제공 수준이 고객의 기대치에 미치지 못하는 폭넓은 의미로 적용
    - 서비스 실패의 예: 서비스 지연, 종업원의 불친절한 태도, 요금계산의 오류, 다른 고객의 반응 등 다양한 요인으로 초래
  - 유형의 제품에 문제가 발생하는 경우, A/S나 교환, 환불 등이 가능
    - 서비스 실패가 발생하면 어떻게 대처해야 할 것인가?

서비스 실패 (Service Failure)

- **서비스 실패**
  - 서비스 실패는 기업의 많은 노력에도 불구하고 그 가능성이 항상 존재
    - 따라서 실패 예방 못지 않게 실패에 대한 대처 전략도 매우 중요
  - 서비스 실패가 관측되지 않았다면 서비스는 성공한 것인가?
    - 서비스에서 실패를 경험한 고객 중 약 45% 정도만 의사 표시, 이중에서 1~5% 정도만 관리자층이나 기업 본사에 전달 (TARP Worldwide, 2007)
    - 실제 서비스 현장에서는 “따지자니 민망하고 가만히 있자니 손해 보는 느낌”의 서비스 실패들도 빈번하게 발생

서비스 실패 (Service Failure)

- **서비스 회복 (Service Recovery)**
  - 서비스 제공이 항상 성공적일 수 없다는 사실을 고려할 때, 단순한 서비스 실패 자체보다는 고객의 향후 소비자 행동에 결정적 역할을 하게 되는 복구 노력이 더 중요
  - 서비스 회복
    - 제공된 제품 혹은 서비스가 고객의 기대에 부응하지 못하여 불만족한 고객을 만족한 상태로 되돌리려는 일련의 과정
    - 고객의 손해를 회복하고 완화시키기 위한 기업의 모든 행동을 의미
  - 회복 공정성
    - 소비자와 기업의 관계에 있어서 소비자가 타인에 비해 “형평성 있게” 서비스 회복을 경험했는가가 중요한 이슈가 될 수 있음.

서비스 실패 (Service Failure)

- **서비스 회복 (Service Recovery)**
  - 회복 패러덕스 (recovery paradox)
    - 성공적인 서비스 회복은 오히려 화가 나거나 실망한 고객조차 충성 고객(loyal customer)으로 만들 수 있음.
  - 2차적 서비스 실패
    - 초기 실패의 경우, 고객이 서비스 회복에 대한 기대를 하기 때문에 즉각적으로 부정적인 효과가 나타나지 않을 수 있음.
    - 초기 실패 이후 서비스 회복에 실패할 경우, 반대로 충성 고객까지 이탈할 정도로 치명적일 수 있음.

ESG

- **ESG (Environment, Society, and Governance)**
  - 정의: 기업의 환경(environment), 사회(social), 지배구조(governance)의 머리글자를 딴 단어로 기업의 지속가능성을 평가하는 하나의 프레임
  - 매출, 영업이익과 같은 재무적 요소뿐 아니라 환경보호, 사회문제 해결, 지배구조 개선 등 비재무적 요소를 고려한다면 지속가능성을 제고할 수 있다는 핵심 가치를 지향
  - 한국거래소에서 2019년부터 자산총액 2조원 이상의 상장사에게 기업지배구조 공시를 의무화하는 등 국내에서도 ESG에 대한 관심이 증대
  - 기업의 사회적 책임(CSR)과 매우 유사한 개념
    - 굳이 차이를 따지자면, CSR이 좀 더 자발적이고 추상적이라면, ESG는 좀 더 구체적이고 측정 가능한 지표를 지향

ESG

- **ESG: Green Marketing**
  - Awareness of environmental protections has increased rapidly in recent years, as enterprises have gradually begun to implement environmental protection concepts in their research and development (R&D), production and marketing processes.
  - The key to green marketing lies in *minimizing business activities' environmental impacts* during raw material acquisition, production, sales, consumption, and disposal processes.
  - As the global trend of environmental protection grows, consumers*' willingness to purchase premium* green products is also increasing.

ESG

- **ESG: Green Marketing**
  - *Starbucks* has extensively promoted green marketing and environmental protection, and claims to focus on the following three aspects of its operations to reduce its impact on the environment:
    - (1) sources of coffee, tea, and paper
    - (2) methods of transportation for products and personnel
    - (3) outlet design and operational methods, such as power and water consumption and waste recycling and treatment.
  - Starbucks reports that it invests more effort in environmental protection than other large coffee companies. In addition, Starbucks promotes its green efforts in its services and products through interior design elements and information pamphlets at its outlets.
  - As a result, most Starbucks customers have a reasonable awareness of the company’s green actions.

ESG

- **ESG 역량과 기업가치**
  - 대부분의 선행연구는 기업이 가진 ESG 역량이 기업가치(firm value)를 증가시킨다고 주장 (Margolis et al., 2009; El Ghoul, Guedhami and Kim, 2015; Qureshi et al., 2019 등)
  - 그러나 ESG에 대한 투자가 불필요한 투자로 간주되어 오히려 투자수익률에 악영향을 미칠 수 있다는 연구(Dorfleitner, Halbritter and Nguyen, 2015 등), ESG 평가 공시에 대한 소비자(주주)의 인식 수준에 따라 기업 평가가 달라질 수 있다고 주장하는 연구(Mervelskemper and Streit 2017 등)도 존재
    - 이것은 ESG 측정의 문제와도 연결 → ESG와 같은 비재무적 성과가 제대로 측정되지 못하기 때문에 소비자(주주)의 인식이 왜곡될 가능성
  - ESG가 어떤 조건 혹은 환경 속에서 기업가치와 소비자 만족에 긍정적인 영향을 미치는지에 대해서는 여전히 많은 연구들이 진행 중임.

ESG

- **ESG 측정이 왜 어려운가?**
  - 본질적으로 *비재무적* 가치
    - "사회적 가치"는 말 그대로 *"사회에 좋은 것(what is good to the social)"*을 의미
    - 예를 들어, 기업이 "환경 문제"를 최소화하는 역량을 측정하여 수치화하기 매우 어려움.
    - ESG 역량이 유발하는 긍정적 효과가 중장기적인 경우도 많아서 더욱 측정이 어려움.
    - 이를 극복하기 위한 하나의 방편으로 ESG 전략 변화에 따른 *기업 재무가치*(예: 주식 시장에서의 시장 가치) 변화 폭을 추적하기도 함.

ESG

- **ESG 측정이 왜 어려운가?**
  - 반대로, ESG를 단순 화폐가치로서 측정해도 되는가?
    - “사회적 가치”는 말 그대로 “사회에 좋은 것(what is good to the social)”을 의미
    - “좋은 것”은 주관적 평가의 결과로서 사회에서 합의된 가치 규범에 따라 판단
      - 즉, 범주적 판단의 형식으로 존재하여 ‘시장 가격’과 같은 단일 척도로 표현하기 어려운 영역
      - 공리주의적 시장 논리(market logic)와 공동체주의적 비시장 논리(non-market logic)의 충돌
    - 대안: 자연어 처리 등으로 가치 판단에 관한 담론을 추출하는 방법 등

ESG

- **ESG 측정**
  - 참고자료: 한국ESG기준원 평가 등급(http://www.cgs.or.kr/business/esg_tab04.jsp)

지배구조, 근로자, 협력사, 환경 등 비재무적인 요소가 기업의 가치 및 성장에 미치는 영향 또한 꾸준히 증가하고 있습니다.
기업은 재무적 위험뿐만 아니라 비재무적 위험을 관리함으로써 지속가능경영을 실천하고,
성장하는 책임투자시장을 통해 자본에 대한 접근성을 높일 수 있습니다.

- 일부만의 전략이 아닌 필수 경영방침으로 자리매김
- 투자자 신뢰회복, 자본시장 활성화를 통한 자본조달 비용 감소, 상장실익 제고
- 기업이미지 개선 및 브랜드가치 제고
- 지속가능한 성장

● 기초데이터 수집

기업공시
(사업보고서,
지속가능성경영보고서,
홈페이지 등) 감독기구 지자체
등 기관 자료
뉴스 등 미디어 자료

약 1000개의 상장회사 평가,
회사별 900개 이상의
기초데이터 수집

● 기본평가

ESG 위험을 최소화하기
위한 시스템이 잘 갖추어져
있는가?

24개 대분류
323개 핵심평가항목

● 심화평가

기업가치 훼손 우려가 높은
ESG관련 이슈가 발생했는가?

57개 핵심 평가항목

● 평가검증

정확한 평가를 위한 다양한
데이터 검증 실시

● 기업피드백

웹기반 평가시스템을 통한
양방향 피드백 실시

선택 | 평가부분 전체 | 평가등급 전체 | 검색

NO	기업명	기업코드	ESG등급	환경	사회	지배구조	평가년도	비고 (조정시기)
1033	AJ네트웍스	095570	B+	C	B+	B+	2022	
1032	AK홀딩스	006840	B+	B	A	B	2022	
1031	AP시스템	265520	D	D	C	C	2022	
1030	BGF	027410	B+	A	A+	B	2022	
1029	BGF리테일	282330	A	A	A+	A	2022	
1028	BNK금융지주	138930	A	A	A	A	2022	

ESG

- **Company-centric CSR vs. Consumer-centric CSR**
  - Company-centric CSR (Traditional CSR)
    - Traditional CSR communication focuses on promoting a company's positive accomplishments for each CSR criterion. The literature on "company-centric CSR" has mostly concentrated *on the actions and outcomes of corporations* in society.
    - Company-centric CSR emphasizes *environmental* aspects such as eco-friendliness, protection, preservation, saving, and sustainability, as well as *social* aspects such as donation, charity, welfare, and contribution. Another important aspect is *governance*, which involves ethics, transparency, and fairness.

ESG

- **Company-centric CSR vs. Consumer-centric CSR**
  - Consumer-centric CSR (New CSR)
    - *Brand activism*, a relatively new phenomenon in the CSR literature, involves a company's adoption of social activities for controversial issues. If brand activism aligns with consumer values, consumers may support the brand's stance on social issues.
    - *Self-improvement* is highly valued by young consumers such as millennials and Generation Z. They are more likely to identify with corporations that undertake advocacy activities as a means of accomplishing their self-enhancement goals.
    - Therefore, young consumers expect companies to speak out on societal issues, and brand activism would be a good strategy to attract them.

ESG

- **Company-centric CSR vs. Consumer-centric CSR**
  - Consumer-centric CSR (New CSR)
    - Consumer-centric CSR studies have focused on the *symbolic* dimension, which reflects how consumers communicate their identities and views through socially conscious brands. This dimension includes attributes such as *identity, self-respect, expression, cause, meaning, value, awareness, and consciousness.*
    - The *hedonic* dimension captures how consumers enjoy the emotional benefits of consuming or supporting these brands, emphasizing attributes such as *goodness, happiness, pride, fulfilment, and satisfaction.*
    - Consumer-centric CSR also considers attributes related to *consumers' behaviors* such as *help, practice, and participation.*

ESG

- **Company-centric CSR vs. Consumer-centric CSR**
  - Company-centric CSR (Traditional CSR)
  - Consumer-centric CSR (New CSR)

CSR-related attributes	
Traditional	**New**
Eco-friendliness	**Goodness**
Society	**Trust**
Sustainability	**Authenticity**
Ethics	**Happiness**
Responsibility	**Awareness**
Donation	**Value**
Charity	**Help**
Welfare	**Fulfilment**
Transparency	**Meaning**
Governance	**Consciousness**
Saving	**Identity**
Protection	**Pride**
Preservation	**Self-respect**
Contribution	**Cause**
Fairness	**Satisfaction**
	Expression
	Practice
	Participation

Prospect Theory

- **Prospect theory**
  - Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. *In Handbook of the fundamentals of financial decision making: Part I*, pp. 99-127.
    - Prospect theory is to explain how individuals make decisions *under conditions of uncertainty (with potential gain and potential loss).*
    - It challenges the classical economic theory of rational decision-making (i.e. expected utility theory) by incorporating *the role of human biases and preferences* in decision-making processes.

Prospect Theory

- **Prospect theory**
  - Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. *In Handbook of the fundamentals of financial decision making: Part I*, pp. 99-127.
    - People underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty.
    - *The certainty effect* suggests that people assign greater value to outcomes that are certain or near certain, even if the expected value of those outcomes is lower than other probabilistic outcomes.
    - For example, imagine a scenario where you have the option to either receive $100 for sure or to take a 50% chance of winning $200. From a rational standpoint, the expected value of the probabilistic option is $100 (0.5 * $200), which is the same as the certain option. However, due to the certainty effect, individuals tend to prefer the certain option even when it offers a lower expected value.

Prospect Theory

- **Prospect theory**
  - Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. *In Handbook of the fundamentals of financial decision making: Part I*, pp. 99-127.
    - *The certainty effect* is related to the concept of *risk aversion*. People are generally *risk-averse* when it comes to potential gains, meaning they are willing to give up some potential gain to avoid uncertainty or risk. The certainty effect contributes to this risk aversion by making certain outcomes more appealing and satisfying, even if the objective probabilities favor other options.
    - Consumers tend to be *risk-averse* when facing potential gains and *risk-seeking* when facing potential losses. In other words, they are more sensitive to losses than to equivalent gains. This phenomenon is known as *loss aversion*.
    - For example, losing $100 is psychologically more significant than gaining $100.

Prospect Theory

- **Prospect theory**
  - Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. *In Handbook of the fundamentals of financial decision making: Part I*, pp. 99-127.
    - The theory suggests that people exhibit a tendency towards *diminishing sensitivity and risk aversion* for gains and *increasing sensitivity and risk-seeking behavior* for losses. In other words, individuals are less responsive to changes in outcomes as they move away from *the reference point*.
    - Consumers evaluate potential outcomes based on *perceived gains and losses* relative to a *reference point*, rather than the final outcome itself. This *reference point* is often influenced by the individual's initial endowment or their current state.

Prospect Theory

- **Prospect theory**
  - Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. *In Handbook of the fundamentals of financial decision making: Part I*, pp. 99-127.
    - The value function is typically *concave for gains*, meaning the marginal value of each additional gain diminishes as it increases. On the other hand, the value function is *convex for losses*, meaning the marginal disutility of each additional loss becomes smaller as losses accumulate.

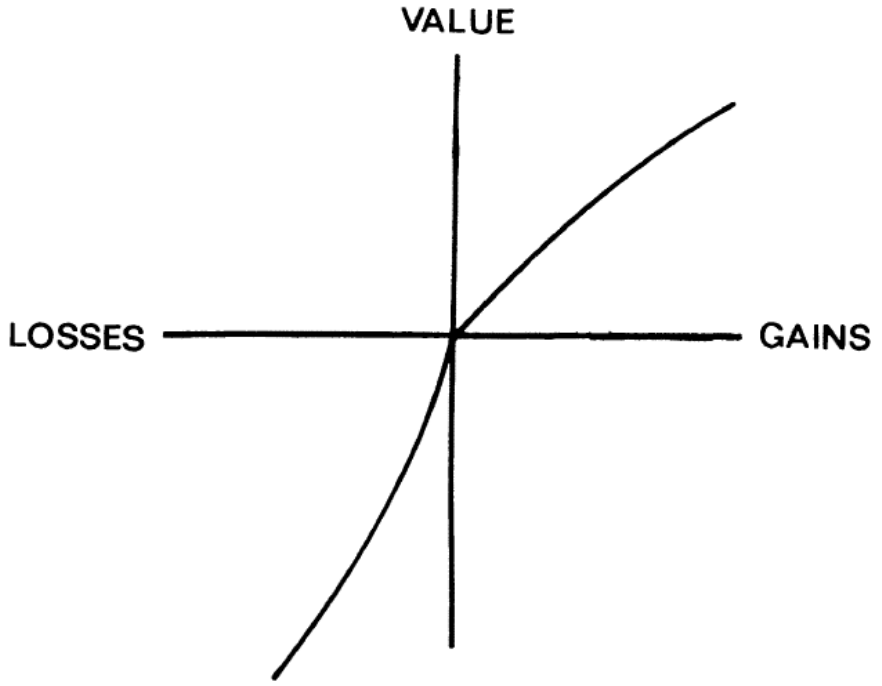


FIGURE 3.—A hypothetical value function.

Prospect Theory

- **Prospect theory**
  - Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. *In Handbook of the fundamentals of financial decision making: Part I*, pp. 99-127.
    - Another key aspect of prospect theory is the notion of *framing*.
    - The way a decision or problem is presented can significantly influence the choices individuals make. People tend to be influenced by the framing of options, even if the outcomes and probabilities remain the same.
    - The theory suggests that individuals are *more likely to take risks when options are framed in terms of potential losses*, while they become *risk-averse when options are framed in terms of potential gains*.

Prospect Theory

- **Prospect theory**
  - Example: a medical treatment scenario where patients are given two options.
    - Option A: "This treatment has a 90% success rate."
    - Option B: "This treatment has a 10% failure rate."
  - Individuals tend to be influenced by the framing of options, even when the underlying probabilities or outcomes remain the same. In this scenario, many individuals tend to prefer Option A, perceiving it as a more attractive choice, even though Option A and Option B convey the same information.
  - The framing effect occurs because the positive framing of Option A triggers a focus on the potential gain (90% success), which aligns with people's risk-averse tendencies for gains. In contrast, the negative framing of Option B triggers a focus on the potential loss (10% failure), which may elicit a more risk-seeking response due to the aversion to losses described in prospect theory.

Bass Diffusion Model

- **Bass diffusion model**
  - The bass diffusion model, also known as the Bass model, is a mathematical framework that describes the adoption and spread of new products or innovations (Bass, 1969).
  - The Bass diffusion model is based on the premise that adoption of a new product occurs through two types of individuals: *innovators* and *imitators*.
    - *Innovators* tend to adopt a new product, driven by their intrinsic motivation to try something new.

      (External factors: advertising and promotion)
    - *Imitators* tend to adopt the product based on their exposure to the innovators and their desire to conform to social norms (social contagion).

      (Internal factors: word of mouth)

Bass Diffusion Model

- **Bass diffusion model**
  - The model assumes that *the rate of adoption at any given time* is influenced by two factors: *the cumulative number of adopters* up to that point (referred to as the cumulative adoption) and *the potential market size* (the total number of potential adopters).
  - The model incorporates these factors into two components: *the coefficient of innovation (p)* and *the coefficient of imitation (q).*

  - The Bass diffusion model can be expressed using the following equation:

$$A_t = p * (M - A_{t-1}) + q * A_{t-1}$$

Bass Diffusion Model

- **Bass diffusion model**
  - The Bass diffusion model can be expressed using the following equation:

$$A_t = p * (M - A_{t-1}) + q * A_{t-1}$$

    - A_t: the number of adopters at time t
    - M: the potential market size (total number of potential adopters)
    - p: the coefficient of innovation
    - q: the coefficient of imitation

Bass Diffusion Model

- **Bass diffusion model**
  - By iteratively applying the Bass diffusion equation over time, starting with an initial number of adopters, the model predicts *the cumulative adoption of the product* over a given period.
  - It provides insights into *the growth patterns of adoption*, and *the timing of peak adoption*.
  - The model has been extended and modified over time to account for various factors (i.e. Generalized Bass Diffusion Model), such as market saturation, competitive effects, and product differentiation.

Bass Diffusion Model

- **Bass diffusion model: Pros**
  - *Simplicity*: The model provides a relatively simple and intuitive framework for modeling the adoption process. It can be easily implemented and understood by practitioners.
  - *Historical data utilization*: The model can make use of historical data on the adoption of similar products or innovations. This allows for data-driven predictions based on past adoption patterns.
  - *Flexibility*: The Bass diffusion model can be extended to incorporate various market conditions, product characteristics, and industry contexts.
  - *Long-term forecasting*: The model can be used to forecast the long-term adoption trajectory of a new product, providing insights into the potential market size and the timing of peak adoption.

Bass Diffusion Model

- **Bass diffusion model: Cons**
  - *Predictions for new products or innovations*: The model needs the mid- or long-term historical data on the adoption to make accurate predictions.
  - *Sensitivity to parameter estimation*: The accuracy of predictions in the Bass diffusion model relies heavily on the estimation of the coefficients of innovation (p) and imitation (q). Small variations in these parameters can lead to significant differences in the predicted adoption curve, and estimating these parameters accurately can be challenging, particularly for new products with limited historical data.
  - *Limited applicability*: The model assumes a linear and self-contained adoption process, which may not accurately capture the complexities of real-world markets.
  - *Lack of individual-level analysis*: The model focuses on aggregate adoption patterns and does not provide insights into the characteristics or behaviors of individual adopters.

Diffusion Model

- **Garber, T., Goldenberg, J., Libai, B., & Muller, E. (2004). From density to destiny: Using spatial dimension of sales data for early prediction of new product success. *Marketing Science*, 23(3), 419-428.**
  - One of the main problems associated with early-period assessment of new product success is the lack of sufficient sales data to enable reliable predictions. We show that managers can use spatial dimension of sales data to obtain a predictive assessment of the success of a new product shortly after launch time.
  - Because word-of-mouth spread is often associated with some level of geographical proximity between the parties involved, one can expect "clusters" of adopters to begin to form.

$$Prob(t) = 1 - (1 - p)(1 - q)^{v(t)+r(t)}$$

Diffusion Model

- **Yi, J., Lee, Y., & Kim, S. H. (2019). Determinants of growth and decline in mobile game diffusion. *Journal of Business Research*, 99, 363-372.**
  - The purpose of the current research is to explore the overall patterns of diffusion and the decline of mobile games, thereby achieving a better understanding of dynamics in the mobile game industry.
  - This study also aims to identify the determinants of the growth and decline in the brand-level life cycle of mobile games.

  - Survival analysis: exponential, Gompertz, Lognormal, and Generalized Gamma regression

개인 프로젝트 안내

- **프로젝트 결과 발표**
  - 일시: **5월 18일, 5월 25일(목) 예정**
    - 개인 발표 일정은 e-class 공지사항 참조
  - 발표 내용

    - 석사 과정: 문헌 연구 요약 리뷰 + 연구 주제 개요 + (예상되는) 시사점 + 데이터 + 방법론

      - 문헌 연구 요약을 간략하게 하는 대신 1차 분석 결과로 대체 가능

    - 박사 과정: 주요 선행 연구 리뷰 + 데이터 및 방법론 리뷰 + 분석 결과 요약
  - 결과보고서는 **6월 1일 23시 59분까지** 일괄 제출
    - 결과보고서 내용: 발표 내용을 논리적으로 서술하되 논문의 작성 양식을 따를 것